OUTLINES OF LOGIC

BY

J. H. GILMORE

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OUTLINES OF LOGIC.

BY

J. H. GILMORE, A. M.,

PROFESSOR OF LOGIC, RHETORIC AND ENGLISH IN THE UNIVERSITY OF ROCHESTER.

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PREFACE.

THIS treatise grew up in the class-room out of the attempt to simplify, for the author's students, the statements to which they were introduced in the best logical text-books that were available, ten years ago, for purposes of instruction. Three years since it was privately printed; and, that edition being exhausted, the author gives his treatise to the public because teachers whose opinion he values have assured him that they wish to make use of it with their classes. Originality and completeness are not claimed for the work. If it possesses any excellences they are simplicity, compactness, and practical adaptation to the wants of the average American student in college and high-school.

The work is (as the author conceives that every text-book should be) a mere outline, designed to be amplified and illustrated, at every point, by the living teacher. The frequent references given to other logical treatises will, however, supply illustrative material of the very best quality to teacher or pupil who carefully consults them.

Brief as the work is, the author has been accustomed to require his classes to memorize *only the leaded matter*

contained in the volume; although considerable attention is given, in the way of class-room discussion, to the somewhat extra-logical matter that is set solid. The entire work was constructed with a view to making the study of Logic practically valuable, and it will, perhaps, yield the best results if approached in a somewhat utilitarian spirit.

UNIVERSITY OF ROCHESTER, *August* 21, 1879.

OUTLINES OF LOGIC.

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1. What is the relation between Psychology, Logic, and Rhetoric?

Psychology (*ψυχή* and *λόγος*) discusses the powers and processes of the human mind; while Logic treats of the products of the human mind.

Taken in its widest sense, Psychology attempts to answer three questions:

1. What is the human mind?
2. What relations does the mind sustain:
   (1) To the body?
   (2) To the external world?
3. What does the mind do? Intellectually, it
   (1) Accumulates materials for thought;
   (2) Retains materials for thought;
   (3) Works up materials for thought:
      a. Into concepts;
      b. Into judgments;
      c. Into reasonings.

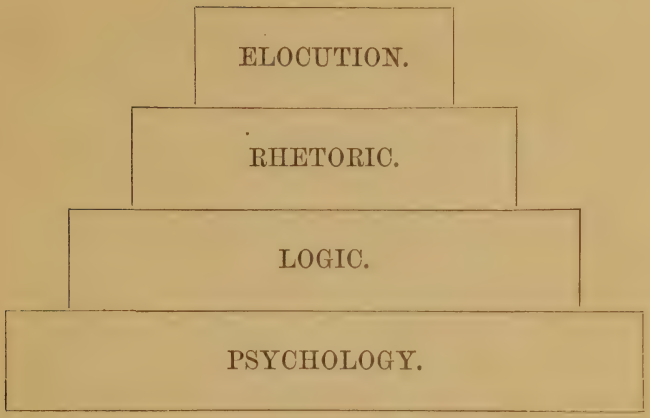
Practically, however, the sphere of Psychology is restricted to those mental processes by which the mind

accumulates and retains the materials for thought; while not merely the products of the human mind, but the processes by which the materials for thought are elaborated and organized, are remanded to Logic.

Note. In strictness, conceiving, judging, and reasoning fall fairly within the scope of Psychology; while concepts, judgments, and reasonings belong to the domain of Logic. It is better, however, to have some one science entrusted with matters so closely related as the processes and products of the same mental faculties.

It will be seen at once that Logic and Psychology are intimately related. The student ought really to have some knowledge of Psychology before entering upon his logical studies—that is: he should study the mind and its processes before attempting to examine scientifically the products of the mind; he should know how the mind collects and retains the materials for thought before he attempts to learn how the mind uses the materials for thought. In some colleges, a term in Psychology wisely precedes the study of Logic. We must content ourselves, however, with the incidental illustration of such Psychological problems as thrust themselves upon us from time to time.

While Logic is thus grounded in Psychology, it has its outcome in Rhetoric, whose province it is to give clear, forcible, and elegant expression to logically-developed thought, and Elocution, whose province it is orally to deliver, in an appropriate and effective manner, thought adequately expressed. The following diagram illustrates the relation of these studies:



2. What do we mean when we speak of the Faculties of the Human Mind?

By a faculty of the mind, we mean the mind's capacity for working in a given direction. Thus, when we speak of "the moral faculty," we mean simply the mind's capacity to decide on questions of right and wrong; when we speak of "the mathematical faculty," we mean the mind's capacity to consider questions of quantity and magnitude. The wisest philosophers regard man's spiritual nature as an entity; and maintain that, however varied its manifestations, it is really one and indivisible. In proof of this, we may notice the *intellectual* weariness that follows excessive *emotion;* and observe that, when the conscience acts, there is an *intellectual* conviction that a certain course is right or wrong, accompanied by a *feeling* of obligation. When we classify the operations of the mind, and enumerate its faculties, let it be distinctly understood that, so far as the mind itself is concerned, our division is purely factitious. We have merely stretched certain lines athwart the object-glass through which we inspect the mental processes. The mind has not, like

the body, a hand for this service, a foot for that, and a stomach for the other. It is, in the strictest sense, a unit. "The mental faculties" is but a convenient phrase for the unit of consciousness as it appears now in this, and again in the other, sphere of intellectual activity.

Of course, if our statements are accepted, the old notion that the head is the seat of reason, while the heart is the seat of emotion (with which compare the still older notion that the *bowels* are the seat of affection and the *liver* the seat of courage), falls to the ground; as does the entire fabric of "Phrenology," which is repudiated by all scientists whose opinion is worth having. Science has as yet fixed no definite abode for any of the human faculties.

3. Classify the faculties of the Conscious Subject, and state with which of these faculties Logic has to do.

The following classification of the mental faculties—substantially that of Sir William Hamilton—is sufficient for our purpose:

- CONSCIOUS SUBJECT.
  - A. COGNITIVE FACULTIES.
    - I. *Intuitive Faculties.*
      1. Presentative—Perception, external or internal.
      2. Re-presentative—Memory, Imagination, etc.
    - II. *Discursive Faculties.* — LOGIC.
      1. Conception.
      2. Judgment.
      3. Reasoning.
  - B. EMOTIVE FACULTIES.
  - C. CONATIVE FACULTIES.

Note. Atwater (*Logic*, p. 27, note) would add Constructive or Plastic Imagination to the Discursive Faculties, giving the reason that Constructive Imagination

must conform strictly to logical rules. For this very reason, however, it does not require recognition here—being included under the head of Conception.

3 : *a*. Define "subject" and "subjective."
Define "object" and "objective."
Define "cognitive," "emotive," and "conative."

"Subject" is restricted in scientific usage to the mind that thinks—the *ego*. "Object" is applied to that about which the mind thinks—the *non-ego*. If the mind thinks about itself, it would be denominated the "subject-object." "Subjective" naturally means, relating to the mind that thinks; "objective," relating to that about which the mind thinks. See Thomson, *Laws of Thought*, p. 35, note. On the terms "subjective" and "objective," as used in poetry, see Masson, *Essays on Wordsworth, Shelley, and Keats*, p. 127 sq.

The "cognitive" faculties (*cognoscere*, to know) are those which have to do with the acquisition of knowledge. The "emotive" faculties (*emovere*, to excite) have to do with the feelings. The "conative" faculties (*conari*, to endeavor) have to do with the will. "The intellect, the sensibilities, and the will" is the nomenclature formerly employed to mark these distinctions; but it is open to objection, as suggesting different centers of mental activity, which do not really exist.

3 : *b*. Explain what is meant by the intuitive as distinguished from the discursive faculties.

The "intuitive" faculties (*in* and *tueri*) are those which, by im-mediate, face-to-face contact, either with external objects or internal states, furnish the mind with the materials for thought. These faculties give us mental presentations of individual objects, and groups of objects —not of classes. Thus, by intuition, the mind grasps

the idea of a book or books, but not the generic notion, book. General notions are elaborated from the individual presentations of the intuitive faculties by the "discursive" or elaborative faculties, whose office is to work up the material thus presented. The "intuitive" faculties bring together the materials for the structure of thought: the "discursive" faculties arrange and combine those materials. Logic has to do with the "discursive" faculties alone. It has nothing to do with collecting the materials for thought, or testing their value—indeed, respecting their value *pure* Logic is utterly indifferent; but is concerned simply with the task of correctly classifying them, comparing them, and unfolding the inferences which may legitimately be deduced from such classification and comparison.

3 : *c*. What do you understand by the "presentative" faculties? the "re-presentative" faculties?

It may be said, in further explanation of our classification of the mental faculties, that the "presentative" faculties—including perception external and internal—are those which take cognizance of objects, or states of consciousness, that are actually present to the mind; the "re-presentative" faculties, those which reproduce to the mind absent objects, or states of consciousness that it has formerly grasped. Under this last head are included Memory and Imagination.

3 : *d*. What are the different functions of Memory?

Memory has two functions: (1) To retain—often beneath the consciousness of the thinking subject *—an object or event once presented to the mind; (2) To recall and identify an object or event once presented to the mind—and this, either through conscious effort (*recollec-*

* Cf. De Quincey, *Confessions of an Opium Eater*, p. 217, where the mind is compared to a palimpsest.

tion, reminiscence) or, involuntarily, through the association of ideas (*remembrance*). With reference to its first function—retention—memory has sometimes been called *quiescent;* with reference to its second function, *active.* This would give us the following classification :

MEMORY { *Quiescent*—simply retentive. / *Active* { Recollection—with conscious effort. / Remembrance—without " " "

By others, the word "memory" has been used with reference to the *retentive* activity ; the word "recollection" with reference to the *recalling and identifying* activity of the mind.

3 : *e.* What do you understand by Imagination? and what distinction is to be made between "simple" and "constructive" Imagination?

Imagination is the image-making faculty. Says Descartes : "To imagine is nothing more than to contemplate the figure or image of a corporeal being." We may, however, imagine a sound, a smell, a taste, as well as a sight, by exciting the sensibility of the auditory, olfactory, or gustatory, rather than the optic, nerves ; though the pictorial representation made to the ear, nose, and mouth is not so vivid as that made to the eye. The materials employed by the imagination must be furnished by the presentative faculties. Hence, there can be no imagination apart from the *retentive* function of memory ; though there may be imagination apart from the *identifying* function of memory. This is less likely to be the case in "simple" imagination—where the mind paints a picture of an object just as it was seen—than in "constructive" or "plastic" imagination, where the mind puts its materials together in new and unseen combinations. For example : Hawthorne once said that the *House of the Seven Gables* was a purely imaginative dwelling—a picture, the various figments of which, if traced back far enough, would ultimately rest upon observation, but which never belonged to any particular residence.

3 : *f*. In what relation do Memory and Imagination stand to each other?

It is generally conceded that, though imagination can act without the coöperation of memory in its identifying functions, memory can not recall and identify without the activity of the imagination. Every thought must have its symbol.

4. Define Logic, in the modern acceptation of the term.

Logic (from λόγος, which denotes the *sermo internus* as well as *externus*—the underlying *thought*, as well as the spoken *word*) is "the science which treats of the necessary, or formal, laws of thought"—that is, of the principles in accordance with which all thinking that is worthy of the name must be conducted.

4 : *a*. What are we to understand by the word "thought," as used in Logic?

Thomson, p. 19, defines "thought" as "that active function of the mind, by which impressions received, either from within or without, are described, classified, and compared." Hamilton (*Logic*, p. 15) says: "The essential characteristic of thought is the comprehension of a thing under a general notion or attribute." Cf. Mansel, *Prolegomena Logica*, p. 32.

When we think, we simply affirm or deny that an object possesses a certain attribute or belongs to a certain class. Three things are essential to thought: 1. An object; 2. An attribute, or a class of objects; 3. Affirmation or negation. E. g.: The bird is flying; John is not a soldier.

Note carefully the restricted sense in which the word "thought" is used. There may be great and varied mental activity, yet no "thought," in the proper sense of that word. Thought is the exercise of the "discur-

sive faculties." Apart from the exercise of these faculties, there may be perception, memory, simple imagination ; but there is no *thought.* See the author's *Art of Expression,* pp. 9, 10.

4 : *b.* What do you understand by Law?

Law is "the constant and regular order according to which an energy or agent operates." (Fleming, *Vocabulary of Philosophy,* p. 285.) Any just conception of "law" involves, back of the law, an energy or agent. Laws do not enact, promulgate, and enforce themselves. The "law of gravitation," for instance, is simply the enunciation of the uniform method according to which a mysterious force acts. The "laws of thought are simply the enunciation of the uniform methods in accordance with which the human mind acts in all correct thinking." (See Jevons, *Logic,* p. 1.)

4 : *c.* What do you understand by a science as distinguished from an art? and what reason is there for regarding Logic as a science rather than an art?

"A science is a body of principles and deductions to explain some object-matter : an art is a body of precepts . . . for the completion of some work. A science teaches us to *know ;* an art, to *do.*" (*Thomson,* p. 26.) There has been much discussion whether Logic should be considered as a science only ; or an art only ; or as, in turn, both. (See *Jevons,* p. 7.) The tendency was formerly to regard it as an art ; but, thus viewed, it should embrace instructions on all points which could facilitate reasoning on any subject (see *Thomson,* § 6), and would necessarily assume vast proportions. Logic is now regarded as a science in which those principles that underlie the process of reasoning, whatever its sphere, are explained and

exemplified till the student understands them and can apply them, modified as the occasion demands, for himself ; the laws which govern the reasoning process being the same, whatever the sphere in which we reason.

4 : *d.* What is meant by the "form," as distinguished from the "matter," of thought ?

By "matter" we mean, in general, the material out of which an object is formed ; by "form," the outline or shape which gives it its peculiar character. Thus, in a statue, the marble is the "matter," which might be changed to bronze, or wood, or putty ; yet, if the outline remains the same, it is still a statue.

The distinction here taken is different from the ordinary distinction between "matter and mind," or "matter and spirit." Thus, Thomson says : "Space may be regarded as 'matter,' and geometrical figures as the 'form' impressed on it. The voice is the 'matter' of speech, and articulation the 'form.'" (See *Thomson*, § 11 ; *Jevons*, p. 4 sq.)

The "matter" of thought is that about which we think. The "form" of thought is what the mind impresses, and, from its constitution, must impress, on that about which it thinks. Thus, whatever the matter of thought may be, the mind impresses on it the form of concepts, judgments, reasonings. From several face-to-face presentations of a book, for instance, I derive the general notion "book," throwing *the matter of thought* into the form of a *concept ;* or, saying "This book is larger than that," I throw the matter of thought into the form of a *judgment ;* or, saying "This book cost more than that, because it is larger," I throw the matter of thought into the form of a *reasoning.* In the *Fordham Logic* we are told that the subject and the predicate constitute the matter of a proposition ; the copula, its form.

The subject and predicate may be indefinitely changed ; but, so long as there *is* a subject and a predicate united by a copula, we still have a proposition.

Logic has to do exclusively with the form—not at all with the matter—of thought. "When we call Logic the science of the formal laws of thought, we mean that the science is only concerned with that which is essential to, and distinctive of, the thinking process"—with the laws determining the form into which the material for thought is thrown. (*Thomson*, p. 39. Cf. *Fleming*, p. 201, and *Hamilton*, p. 53.)

4 : *e*. What do we mean when we speak of the "necessary laws" of thought?

That there are certain laws in accordance with which the mind must think, if it think at all, no matter what the object of its thought may be. In order to be *necessary*, these laws must be :

a. Determined by the nature of the thinking subject ;
b. Original, and not acquired ;
c. Universal.

See *Hamilton*, pp. 17–18 ; *Thomson*, § 9. If the laws of thought do not conform to these conditions, they are manifestly contingent and accidental—not necessary.

5. How does the true object which Logic contemplates differ from that which is sometimes assigned to it?

Logic has no trick, or device, to teach, which can make the dull student more than a match for him who is by nature keen and bright. Hence it is not reasonable to compare the trained logician of inferior native capacity with the naturally acute and strong-minded man, devoid of logical training. In this popular misapprehension of its claims, Logic suffers from the extravagant pre-

tensions of its early votaries. The true object which Logic contemplates is, simply, to analyze the processes of thought that we have been carrying on from childhood, and explain the principles on which they have been conducted—showing how they have succeeded, and why they have failed. The simplest sentence that we utter is "a logical judgment," and contains "a logical concept." When we study Grammar, we really study Logic—or *might* study it, if we would only dig down through the sentences that we analyze to the underlying thought. See the author's *Art of Expression*, p. 6. Cf. *Thomson*, § 45 and p. 82; also Bowen, *Logic*, p. 40.

M. Jourdain in Molière's *Bourgeois Gentilhomme* says: "Par ma foi, il y a plus de quarante ans que je dis de la prose sans que j'en susse rien." Something similar might well be said of Logic.

6. What is the distinction between Pure and Applied Logic? and what is the natural order of their development?

"Pure Logic" treats of logical principles considered in themselves, without regard to their practical application. "Applied Logic" treats of logical principles as practically employed in the discovery and vindication of truth. Without serious violence to language, "Pure Logic" might be called the *science*, "Applied Logic" the *art*, of reasoning.

The order of their development is: first, reasoning; then, reasoning regularly conducted with a view to a practical end; then, the science of reasoning, pure and simple. Or: first, logical processes; then, logical precepts; then, logical principles. This is the natural order of development in any science. (See *Thomson*, §§ 1–5.) In the order of development, therefore, "Applied Logic" precedes "Pure Logic." It is only by the analysis of processes of thought previously carried on that an art of

thinking can possibly be constructed; only by gathering up and referring to general principles the different precepts of an art of thinking that a science of thought can be created.

7. What advantages may reasonably be expected from the study of Logic?

The practical advantage of Logical studies has been stoutly denied on the ground that, without logical training, men reason soundly and well.

See *Locke*, as quoted in Whately's *Logic*, *Introduction*, § 3; Macaulay, *Essays*, vol. II., pp. 372, 395 sq.

The tendency to deny the practical advantage of logical studies has been intensified by the extravagant pretensions of the early devotees of this science. Their eulogies have, however, frequently been misinterpreted. Thus when Duns Scotus styles Logic "*Ars artium et scientia scientiarum, qua aperta, omnes aperiuntur, et qua clausa, omnes aliæ clauduntur*," he does not mean that Logic is the best and highest of all the sciences, but the servant and minister of all—a fact which is attested by the further fact that "The very name of Logic occurs as part of nearly all the names recently adopted for the sciences, which are often vulgarly called the 'ologies,' but are really the 'logics'—the 'o' being only a connecting vowel or part of the previous word. . . . Each science is thus confessed to be a special logic." (*Jevons*, p. 6.)

That Logic has its uses—altogether apart from the satisfaction that is afforded by the investigation and analysis of our noblest mental processes—can not, however, be successfully controverted. These advantages are:

1. The mental discipline afforded by mastering its difficulties.

2. The habits of accurate statement acquired by familiarity with a science whose terminology is so exact.

3. The repression of tendencies to hasty and incorrect thinking, by the careful analysis of correct processes of thought. In this way—indirectly, but none the less surely—Logic teaches us to reason, by showing us how men *have* reasoned.

4. The ability acquired to detect and, by a system of concise and accurate nomenclature, expose fallacious reasoning in ourselves and others. The trained logician knows just where to look for the weak point in an argument, and just how to expose it when detected. He may be compared, within his sphere, to a skilled mechanic, or a man accustomed to open oysters. See *Hamilton*, p. 35. Cf. Broadus *On the Preparation and Delivery of Sermons*, p. 206.

5. The training imparted to the inferential or suggestive faculties. See *Thomson*, p. 79, who says:

"The suggestive power may be educated as certainly as, though more gradually than, the critical. The discovery which we call a flash of genius, a happy thought, really depends as much upon previous acquirements as the power of stating a case or applying a rule does. These bright suggestions never occur to the ignorant; they have the facts before them, but their imaginations are not trained to leap to the proper inference from them. All discipline of the suggestive must proceed from the critical power; it is by a long, careful, patient analysis of the reasonings by which others have attained their results that we learn to think more correctly ourselves." Almost equally significant with this remark of Thomson's is the statement of La Place that "An acquaintance with the methods by which men of genius have arrived at their discoveries is scarcely less useful to the progress of science than those discoveries themselves."

For illustrations of what Thomson here intends, see his *Laws of Thought*, p. 259 sq. Cf. *Hamilton*, p. 32. One of Thomson's illustrations may be found in this treatise, under topic 57 : *c*.

On the entire subject, see *Thomson*, §§ 36, 37, 45; *Whately*, pp. xviii–xxii.; Everett, *Science of Thought*, pp. 3–4.

8. Enumerate the sources from which Logic derives its materials.

The sources from which Logic derives its materials are:

1. Intuitions of the phenomena of the external world;
2. Intuitions of the phenomena of the conscious subject;
3. Intuitions of the structural functions of the conscious subject.

8 : *a*. What questions have been raised respecting the validity of these sources of knowledge?

Two questions have been raised with reference to these alleged sources of knowledge—questions which it does not fall within the province of Logic to discuss and settle, but which we ought certainly to note in passing.

The first question is: *Do the senses report to us truly concerning the outward world?* On this point the *popular* view is, that there is an external world which is precisely what the senses represent it to be. Certain philosophers, who are known as *Idealists*, affirm, however, that we have no certainty that the external world is what it seems to us to be; nay, some of them go so far as to affirm that we have no knowledge that an external world exists. All that we can *know*, they affirm, is certain sensible affections of the thinking subject. Anything beyond that is mere matter of inference, which may or may not be valid. Other philosophers, called *Realists*, insist that we know through the senses that there is an external world, and that the senses report to us correctly concerning the primary qualities of matter at least; though they concede that, taken as a whole, our conception of the external world is the resultant of two determining causes—objective existence presented to the mind, and the mind's pecu-

liar activity in dealing with this objective existence. That our senses are not absolutely trustworthy may be inferred from the phenomenon of "color-blindness"; from a blow on the head which causes us "to see stars"; from the erroneous report of the senses when we roll a marble under the crossed fingers, or thrust a stick, on a bright day, into a running stream. (See *Thomson*, § 10; Masson, *Recent British Philosophy*, p. 56 sq.; Everett, *Science of Thought*, pp. 13–22; *Tent Life in Siberia*, pp. 254–5.) This question must, of course, be remanded to Psychology and Metaphysics—Logic being a formal science, and altogether indifferent as to the reality or unreality of the material with which it works. It may be said, however, that the presumption is in favor of the credibility of the senses; and that the burden of proof rests upon those who question the validity of this source of knowledge.

The second question is: *Has the mind structural functions which limit and condition it in dealing with the materials of thought?* Does it, as Bacon affirms, "like an uneven mirror, blend its own nature with things as they are, distort and discolor them"? or does the mind simply reflect and register presentations, just as they are, without subjective modification? The first view is that of the *Transcendentalists*, i. e., those who believe that there is something in the mind which transcends experience; the second, that of the *Empiricists*, who believe that all our knowledge is but transformed experience.

The views of our modern Empiricists are adequately stated and ably combated in the *Thæetetus* of Plato (Trübner ed., vol. I., p. 251): "For the man who knows anything seems to me to apprehend through the senses what he knows; and, indeed, as it now appears, knowledge is nothing else than sense-perception."

For our present purpose, we assume the correctness of the first view. See *Thomson*, §§ 32, 33, and *Masson*, p. 36 sq., p. 48 sq.

8: *b*. What do you understand by the structural functions of the mind; necessary truths; supersensuous truths; a priori truths?

When we speak of the "structural functions of the human mind," we mean that the mind is not a plane mirror,

or a sensitized plate, reflecting and registering, without modification, impressions received *from some determining agency;* but is so constituted that it must work in certain directions and develop certain ideas which mere sense-perception could never confer upon it. Such ideas are those of time, space, cause and effect, the axioms of mathematics—and, in general, those ideas the contrary of which is unthinkable. These truths are called *necessary* truths, because, so soon as the mind begins to think, it can not fail to apprehend them—because it accepts and holds them instinctively, without regard to any process of demonstration by which they are established. Necessary truths require to be comprehended, but they do not require to be proved. That two straight lines can not inclose a space would not, probably, strike us as a self-evident truth if it were stated in Choctaw. These truths are also called *supersensuous* truths, because no amount of mere generalization from the *data* afforded by the senses can account, not for the mere existence of the truths, but for *that imperative necessity with which the mind invests them*, and which is their most distinguishing characteristic. See *Mansel*, pp. 92 (especially note) and 97. They are also called *a priori* truths, because, to borrow the language of Hamilton, "they are potentially in the mind, anterior to the act of experience by which they are first elicited in consciousness"; but it is not claimed by Hamilton, or any modern philosopher, that they *actually exist* in the mind prior to experience. Bain, *Deductive Logic*, p. 10, incorrectly represents the Transcendentalists just here.

(* See last page of cover.)

9. What are the three general divisions of Pure Logic?

(1) *Conception*, which treats of the method of forming general notions.

(2) *Judgment*, which treats of the comparison of no-

tions to test their agreement or disagreement with each other.

(3) *Reasoning*, which treats of the method of deducing one judgment from another judgment, or other judgments.

9 : *a*. Is the order in which they are discussed in Logical text-books the natural order?

In pursuing the study of Logic, two methods are open to us, the analytic and the synthetic. Adopting the analytic method, we should break up the finished argument of an orator : 1, into reasonings ; 2, into judgments ; 3, into concepts or general notions. This would, of necessity, be our method if we were attempting to create a science of Logic ; and then we should naturally discuss the general divisions of our subject in the following order : 1. Reasoning ; 2, Judgment ; 3, Conception. The process of analysis has, however, been gone through with again and again, and all its results are before us. We can, therefore, if we prefer, adopt, as more convenient for purposes of instruction, the synthetic method, and, approaching the divisions of our subject according to the relative simplicity of the processes which they involve, discuss : 1, Conception ; 2, Judgment ; 3, Reasoning. This course we shall adopt. See *Thomson*, § 41.

9 : *b*. Are Conception, Judgment, and Reasoning independent processes, or mutually related?

It should be borne in mind that Conception, Judgment, and Reasoning are not strictly independent processes ; but, "in reality, only various applications of the same simple faculty, that of comparison" (*Hamilton*, p. 194) ; and that "concepts, judgments, and reasonings fall into different classes, as the act—and consequently the result of the act—is of a greater or less simplicity." (*Hamilton*, p. 83. Cf. *Atwater*, p. 83 sq.)

10. State the four Fundamental Principles which underlie the Laws of Thought.

These principles serve merely to test the formal correctness of our thinking—its self-consistency. Our thinking may be correct in form, yet not true in matter; but it can not be materially true unless it is formally correct. See *Thomson*, p. 250; *Bowen*, p. 42.

The principles referred to are:

I. "The Principle of Identity, which expresses the relation of total sameness in which a concept stands to all, and the relation of partial sameness in which it stands to each, of its constituent parts. Its formula is $A = A$." (*Hamilton*, p. 57.)

The formula may also be stated: $A = \left(A\frac{A}{A}\right)$; $\frac{A}{A} = \frac{A}{A}$.

To illustrate the importance of this principle: Leibnitz says, "The geometrician proceeds from hypothesis to hypothesis; and, while the thought assumes a thousand different forms, it is still but by an incessant repetition of the principle 'the same is the same' that he performs all his wonders." Condillac says, "Equations, propositions, judgments, are, at bottom, the same; and, consequently, the reasoning process is the same in every science." Cf. *Everett, Science of Thought*, p. 102.

Scholia. (a) Unless a thing be equal to itself—that is, maintain its essential identity—there can be no such thing as thought. (b) Things that are equal to the same thing are equal to each other. E. g.: $A = B$, $B = C$, therefore $A = C$. (c) What is affirmed or denied of a whole, may be affirmed or denied of its parts. E. g.: Man is a rational animal; John is a man; therefore John is a rational animal.

II. The Principle of Non-Contradiction. Aristotle's statement is: "The same attribute can not be at the same time affirmed and denied of the same object."

That is: a thing can not be, at the same time, A and not-A; a diagram can not be, at the same time, square and not-square. Kant's statement is: "The attribute can not be contradictory of the object." E. g.: A triangle can not be round. The formula for this law is $A - A = 0$. E. g.: Let A represent "two straight lines in the same plane which, however protracted, will never meet." You are required to think of those lines as meeting. The result is $A - A = 0$, the negation of thought.

III. The Principle of Excluded Middle; that is: Of two contradictories, one or the other must be true; there is no middle course. Examples of contradictories are:

No X is any Y;
Some X is some Y.
The table is square;
The table is not-square.

The table must, of course, be either square or not-square.

Besides *contradictory* opposition, Logic recognizes *contrary* opposition; in which both judgments can not be true, but they may both be false. For instance:

No X is any Y;
All X is all Y.
The table is square;
The table is round.

In these cases of opposition the judgments can not both be true, but they may both be false. The truth may be:

All X is some Y.
The table is oblong.

IV. The Principle of Sufficient Reason; that is: "Whatever exists must have a sufficient reason why it is as it is, and not otherwise." (*Leibnitz.*) So far as this principle demands recognition in Logic, it simply insists

that the mind is not left to act capriciously; that every logical consequent has its legitimate antecedent.

10: *a.* What distinction is to be made between "reason and consequent" and "cause and effect"?

By *reason and consequent* we do not mean *cause and effect;* though cause and effect stand to each other in the relation of reason and consequent. Reason and consequent, or antecedent and consequent, have relation to the *form* of thought—the necessary sequence of ideas; cause and effect, to the *matter* of thought—the necessary sequence of real existences. "A cause is something which not only precedes, but has power to produce the effect." (*Fleming.* Cf. *Thomson,* p. 148.) What is meant by the fourth law is: Reason and consequent are correlative. When a reason exists, there must be a consequent; and *vice versa.* When no reason exists, there can be no consequent; and *vice versa.* See Topic 51: *a.*

10: *b.* Does the fourth principle stand on the same footing as the other three?

The last law stands on quite a different footing from the other three, which are really but different phases of the same principle. It is frequently regarded as falling within the province of Metaphysics rather than Logic, in which case "reason and consequent" are confounded with "cause and effect." The fourth law, as the basis of the conditional syllogism, seems properly to belong to Logic; although it occupies a position subordinate to the other three, and might, conceivably, be dispensed with.

In regard to the first three laws, Hamilton says: "Whatever violates the laws whether of identity, of contradiction, or of excluded middle, we feel to be absolutely impossible, not only in thought but in existence. Thus, we can not attribute even to Omnipotence the power of making a thing different from itself, of making a thing at once to be and not to be, of making a thing neither to be nor not to be." (*Logic,* p. 70.) On this conditioning of Omnipotence, see *Mansel,* p. 77.

11. What do you understand by conception? what by an intuition? what by a concept?

Conception (*con* and *capere*) is that power or process of the discursive faculties by which several intuitions of individual objects are combined into a general notion.

By an "intuition" (*in* and *tueri*) we understand an im-mediate, face-to-face presentation of an external object or an internal state.

By a "concept" (*conceptum* = what is conceived) we understand the general notion at which we arrive as the result of the process of conception. Cf. *Thomson*, § 47.

It is a convenient, and is coming to be a very general, custom to use the term "conception" to designate the process of forming general notions; the term "concept," to designate the general notion which results from that process. "Perception" and "percept" are used (though not so widely) with a similar discrimination.

11 : *a*. Explain and illustrate the method of forming concepts.

(1) There must be placed before the mind several representations of essentially similar, but in some respects different, objects. E. g. : Several books—one a logic, another a history; one in English, another in Latin; one in cloth, another in leather; one in 4to, another in 12mo; one costing 25 cents, another $5; etc., etc.

(2) The mind must reflect upon the characteristics of these different objects—carefully discriminating what is common to all, and necessary to constitute each "a book," from what is accidental or exceptional in any given case (as, for example, the object-matter, the language, the binding, the size, the expense, etc., etc.).

(3) The mind must withdraw its attention from that which is accidental and peculiar in the objects before it; and fix its attention on that which is essential and com-

mon. This is a psychological statement of the next step in the process. (See *Mansel*, p. 37 sq.) Logically speaking, the mind *abstracts*, or draws off, the *essential* from the *accidental* qualities of the objects before it—those qualities which belong to *all* the objects, from those which belong to only *some* of them. In the case before us, the essential qualities are: (a) printed leaves; (b) substantially fastened together.

(4) The mind extends its notion of an object which (whatever else it may possess) possesses the essential qualities noted, to a class. It generalizes the results of its observation and reflection. It conceives of something which is not *this* book, *that* book, or the *other* book, but BOOK in the widest sense of the term—including all books that ever have been or ever will be.

If our general notion be formed from an inspection of an insufficient number of individual presentations, it will soon need revision; as, for instance, in the case which we have chosen for illustration, the first time one comes in contact with "a blank book." The way in which our general notions are extended and modified by increased observation and reflection is well illustrated by Thomson, *Laws of Thought*, § 48. It is to be noted, also, that no sooner have we formed a concept than we begin to discriminate it into subordinate concepts; and that almost every general term is used in a figurative as well as a literal sense—as when we speak of "the book of nature."

(5) The mind gives to the general notion thus formed a name by which it can identify and recall it—generally the same name which it had been accustomed to apply, in a narrower sense, to the first object of this kind with which it was acquainted.

While the process of Conception may be analyzed into the five different stages already discriminated—which are known as Comparison, Reflection, Abstraction, Generalization, and Denomination—it should be borne in mind

that, practically, the process is so rapid, or so far beneath consciousness, as generally to set at nought all attempts at analysis; and that the different steps which have been indicated are not independent processes, but in reality one process.

An extra-logical problem here suggests itself, which possesses no little interest. Does not the man whom Thomson introduces (p. 94) start with the general notion "sea"; and is not the process one of clarification? Does he not, at least, set out with the idea that a general notion is possible? If so, where does he get that idea? Does the particular always precede the universal? See *Mansel*, p. 41 sq.; Hamilton, *Lectures on Metaphysics*, pp. 492–501; Reid's ed. of Stewart, V. III., p. 110; Bain, *Deductive Logic*, p. 7.

11 : *b*. Why is Denomination regarded as essential to the process of conception?

Denomination is regarded as essential to the process of forming a concept, because, without giving names to our general notions, it is impossible to retain, identify, and impart them. They evaporate like an uncorked volatile odor. See *Atwater*, p. 54. There is an objective existence whose mental reproduction helps us to recall and identify the *individual presentation;* but nothing in nature corresponds to the *general notion.* Hence, without some note or symbol, it could not be retained or recognized. The name is to the concept, according to Hamilton (*Logic*, p. 98), as a fortress is to a subjugated country, or the archway to an excavated tunnel. It helps us to hold what the activity of thought has already secured.

12. State the threefold question respecting the relation of thought to language; and indicate the answers which you would give.

The question respecting the relation of thought to language is threefold:

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(1) *Are language and thought identical?* Does language correspond to thought as the raised figure on embossed paper corresponds to the depression caused by the stamp on the other side? Are the two coördinate, standing in the same relation to the human mind—the stamp? Is their correspondence necessary, absolute, and universal? If so, we may found an analysis of the reasoning powers on an examination of language, rather than thought, if more convenient. See Everett, *Science of Thought*, p. 66 sq. Yet Whately is soundly belabored by Hamilton (*passim*) for treating of language rather than thought.

(2) Discriminating between thought and language, *Is thought possible without articulate speech as its instrument?*

(3) *Is thought possible without some sort of language as its instrument?* Do babes think? Do the brutes? Do the untrained deaf and dumb?

On these questions, see *Thomson*, §§ 27, 28; *Mansel*, p. 26 sq.; *Whately*, § 5 and note; *Dictionnaire de Linguistique*, p. 167 sq., and notes to pp. 118, 139; Bascom, *Comp. Psychology*, pp. 161 sq. (cf. 209, 211 sq.). *Per contra*, see M'Cosh, *Logic*, p. 64 sq., and Whitney, *Language and the Study of Language*, p. 403 sq.

12: *a*. In what senses are the words "thought" and "language" to be used in this discussion?

In discussing these questions, it must be borne in mind that the word "thought" is used in the restricted sense already indicated (Topic 4: *a*); while "language" is not to be confined to *articulate* speech, but covers any method of communicating or symbolizing thought. See *Thomson*, § 18 and note.

Failure to arrive at a correct understanding of the relation of thought to language arises, almost invariably, from misapprehension of these terms. Giving to "thought" and "language" the meaning above indicated, it would seem to be indisputable that there can be no thought without language. The general notions which are indispensable to thought can not be retained and employed without some method of symbolization.

13. Explain Leibnitz's distinction between notative and symbolic terms; and show its bearing on the question respecting the relation of thought to language.

When an object presented to the mind is so simple that we apprehend at a glance its essential qualities (and give it a name which indicates them), we are said to have an intuitive knowledge of the object, and the term by which we characterize it is called *notative*. When the object is so complex that we do not apprehend at a glance its essential qualities, our apprehension of the object is said to be symbolic, and the term by which we characterize it is called *symbolic*. Frequently a symbolic and a notative term for the same object are combined in one sentence. E. g.: "Rochester" (*symbolic*) "is a city of 80,000 inhabitants, situated on the Genesee River, six miles from Lake Ontario" (*notative*).

For the distinction here indicated, we are indebted to Leibnitz, for whose original statement see Mansel, *Proleg. Log.*, p. 37, note, and Baynes, *Port Royal Logic*, p. 423 sq. Cf. *Thomson*, § 25; *Hamilton*, p. 128; *Atwater*, p. 67; *Jevons*, pp. 57–60

The words in a language can not be absolutely classified as "notative" or "symbolic." The same word may be a "symbol" to one man, while to another man, of greater mental acuteness and larger attainments, it is a "note." The same word may be, to the same man, at one time a "note" and at another a "symbol," according to the degree of his mental activity and his opportunity to explicate his thought. There are many words, however (as, for example, "state," "society"), which denote objects so complex that they may be regarded as used symbolically by the entire race. Such words pass from mouth to mouth, without our stopping to explicate their value, or attaching to them any precise and definite meaning; just as a dollar passes from hand to hand, without our stopping to think that it is made up of a thousand mills. Unquestionably, much of our speech and nearly all of our thinking involve very largely the symbolic use of terms. When we claim that language is essential to thought, therefore, it is not intended to assert that all the discursive processes are fully drawn out in words to which a sharp and definite meaning is attached.

13: *a*. What advantage, and what disadvantages, arise from this symbolic use of terms?

The advantage is that, like the use of signs in an algebraic process, it greatly abbreviates and facilitates the processes of thought. Much of our thinking is thus carried on in a sort of mental shorthand.

The disadvantages arise from the fact that we frequently use terms symbolically without being able, on demand, to explicate their meaning; that is, we suppose ourselves to be thinking, when we have in reality no clear and definite thought.

See M'Cosh, *Logic*, p. 70 sq.; Bowen, *Logic*, p. 24 sq.; *Mansel*, p. 36.

14. What views have been held respecting the existence of realities which correspond to general terms; and which view are you inclined to adopt?

The controversy between the Nominalists and the Realists, which was carried on with intense feeling during the scholastic age (not only from its philosophical significance, but from its bearing on certain grave theological questions—see Bain's *Mental Science*, Am. ed., Append., p. 24), had reference to the existence or non-existence of realities corresponding to the general terms which result from the process of conception. The question was, for instance: "Is there an existence which corresponds to the general term *man*, altogether apart from any particular man—any individual member of the human family?" The Realist, following out Plato's *doctrine of ideas* (see *Republic*, B. 7, Ch. 1; cf. Fleming, *Vocab.* sub voce "Idea"), answered: "Yes, there is, outside of the human mind, a real existence which corresponds to every general notion. 'Universals' exist apart from, and independent of, 'particulars'—apart, also, from the mind that apprehends them." The Nominalist, following out the suggestions of Aristotle, answered: "No. The universal exists only in the particular. The general term is a mere name to which no objective reality corresponds—a convenient designation for individual objects which possess similar attributes." Among both Realists and

Nominalists there were, of course, various shades of opinion. Ultraists in either direction are rarely met with at the present day. Thinkers of the school of Comte, J. S. Mill, and Herbert Spencer are avowed and tolerably pronounced Nominalists. Avowed Realists are more rarely met; though there is still much latent realism, especially in theological circles. See Garden, *Outlines of Logic*, p. 153, who insists that realism is divinely inculcated.

The position most frequently taken at the present time, respecting the existence of "universals," is that of the Conceptualist, who, holding middle ground between the Realist and the Nominalist, affirms the existence *in the mind, but not apart from the mind*, of realities corresponding to general terms. That is, the Conceptualist concedes that, objectively, the universal exists only in the particular; but claims that, subjectively, it has independent existence in the mind of man—in the divine mind, as well as the human, according to most Conceptualists. For example, the general notion "vertebrate animal" existed in the mind of God before the creation of the animal kingdom. See *Thomson*, p. 117, and Agassiz, *Structure of Animal Life*, p. 117. The general notion *triangle* exists in the mind of man, as a concept generalized from individual objects, altogether apart from any particular triangle. This the Conceptualist of to-day affirms, but the Nominalist denies. To the question, "Is it possible to conceive of a triangle which is neither equilateral, rectangular, nor scalene, but all these at once?" the Conceptualist answers, "Yes"; the Nominalist answers, "No." It is certain that the general notion *triangle* can not be objectized; that no image or picture of the universal triangle can be formed. This is, probably, what the Nominalist means by saying that the concept *triangle* has no real existence. But is the formation of a mental picture of the universal triangle essential to the existence of the concept? May we not think *triangularity*, holding in abeyance the qualities and proportions of the sides and angles? May not the mind grasp at the same time the notions of triangles equilateral, rectangular, and scalene, so as to gain from their contemplation a general notion of all that is common to each—as the eye, glancing at a handful of cherries, takes in no one cherry in particular, but all at once? Or does the

mind, passing with incredible rapidity from one notion to another, seem to take in all at once, while its receptivity is in reality successive? See James Mill, as quoted in the appendix to Bain's *Mental Science*, Am. ed., p. 31.

In many cases, doubtless, the mind objectizes the general notion *triangle* by the image of that particular triangle with which it is most familiar, maintaining a mental protest that the image is inadequate to its purpose. But is this always so? And does not the mind's conscious protest in such a case attest the existence of a general notion which, we have freely conceded, can not be objectized?

In favor of Conceptualism, as opposed to Nominalism, we may allege the tendency of men of different ages and different nations to form the same concepts—a point which is well stated by Thomson, *Laws of Thought*, p. 117. With reference to Realism (which is regarded by philosophers of the present day as an exploded notion, with which even the philosopher from whom it was derived was never more than half satisfied) the following questions may not be impertinent:

(1) What evidence have we of the existence of objective realities corresponding to general terms?

(2) What is gained by their recognition? As Occam says: *Entia non sunt multiplicanda præter necessitatem.*

(3) Precisely what are they?

(4) Just where are they?

(5) How do these universals—conceding their existence—influence and modify the individuals of which they are the types? What, for instance, is the tangible connection of the universal, archetypal man with John Doe and Richard Roe?

On this general subject, the following works may be consulted: *Thomson*, pp. 116–126; Hamilton, *Logic*, pp. 91, 97, and *Metaphysics*, pp. 476–492; Schwegler, *Hist. of Phil.*, p. 100; Mill, J. S., *Logic*, p. 117 sq., Amer. ed.; Bain, *Mental Science*, pp. 176 sq., and appendix, and *Deductive Logic*, pp. 5–6; Garden, *Outlines of Logic*, appendix.

15. Define genus, species, individual, differentia, essence, mark. Classify marks.

Genus may be defined as (1) a class of objects, (2) associated together upon the basis of essential similarity, and (3) susceptible of subdivision into classes.

Species are the subordinate classes into which a genus is divided.

An *individual* (*in-dividere*) is that which can not be divided without ceasing to be what it is; as, for instance, a sword, a man. The individual is the unit out of which subordinate classes are formed. When a *class* is divided, its separate members can bear the name of the class. When an *individual* is divided, its separate parts can not bear its name.

Differentia may be defined as the attribute, or attributes, which distinguish an individual or a class from the class to which it belongs. E. g.: Rationality differentiates man from the class animals.

Essence (*essentia*, root *esse*) is that in which the very being of a thing resides—that which constitutes it what it is. *Id per quod res est, et id est, quod est.*

By *marks* we are to understand those attributes or qualities by which we recognize an object, and assign it to its appropriate class.

Marks are to be divided into *essential*—which always accompany an object, and *accidental*—which may or may not accompany it.

They are also to be divided into *contradictory*—which are opposed to each other in the very form of expression, as "sweet" and "not-sweet," "wise" and "unwise"; *repugnant* (better, *contrary*)—which are opposed to each other in matter, but not in form, as "sweet" and "sour," "wise" and "foolish"; and *compatible*—between which no opposition exists.

For further classification under the head of "marks," see Bowen, *Logic*, p. 62.

16. Explain the distinction between obscure and clear, confused and distinct, inadequate and adequate presentations.

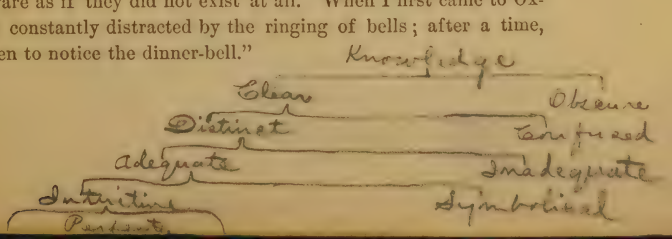
By a "presentation" we mean the impression which any object makes upon the mind. Sometimes these impressions are made without being noticed at the time. For instance, a clock strikes while we are busy at study. We do not notice it at the time; but afterward, knowing that it must have struck, we dimly recollect hearing it.* These unrecognized presentations are called, in Logical nomenclature, "obscure," in opposition to those recognized presentations—called "clear"—with which alone Logic has to do.

Clear presentations, or "cognitions," are subdivided into "confused" and "distinct." When we clearly recognize a thing, but can not tell *how* we recognize it—e. g., the color red—our presentation of it is said to be "confused"; when we can give the marks by which we recognize it, our presentation of it is said to be "distinct."

If we can go still farther, and *explain* the marks which we have just given—or "give the marks of the marks"—our presentation is said to be "adequate"; if not, it is said to be "inadequate."

There are, of course, various degrees of adequacy. Indeed, clearness, distinctness, and adequacy are, in themselves, but different degrees of the same general faculty, cognition. See Hamilton (who is especially happy in treating this subject), *Logic*, pp. 112–118. Also, *Thomson*, § 46; *Jevons*, p. 53 sq.; Baynes, *Port Royal Logic*, p. 423 sq.

* Max Müller says (*Science of Lang.*, Vol. II., p. 118), "There are many things which we perceive at first, and which we perceive again as soon as our attention is called to them, but which to us, in the ordinary run of life, are as if they did not exist at all. When I first came to Oxford, I was constantly distracted by the ringing of bells; after a time, I ceased even to notice the dinner-bell."



17. Define summum genus, infima species, subaltern genus and species, proximate genus and species, coordinate and disparate species.

Summum genus is the highest class that we recognize in a connected system of classification; *infima species*, the lowest. All between are *subaltern genera* and *species*—genera to the class below, and species to the class above. *Proximate genus* is the class next above a given class in a connected system of classification; *proximate species*, the class next below a given class. *Coördinate* species are species belonging to the same genus; *disparate species* (*dispar*, unequal) are species belonging to different genera.

Note:- The Differentia + the genus makes (=) the Species.

18. What is meant by Extension and Intension, and what is their reciprocal relation?

The "extension" of a concept (*ex-tendere*) is its capacity to denote objects. The more objects it includes, the greater its extension. The "intension" of a concept (*in-tendere*) is its capacity to connote marks. The more qualities or attributes it suggests, the greater its intension. Extension and intension stand to each other in reciprocal relations. As the extension of a concept increases (i. e., as it is made to include more objects) its intension diminishes (i. e., it indicates fewer qualities), and *vice versa*. The extension of the word "plant," for instance, is great—it includes objects almost innumerable, from the lichen to the oak; but it suggests few qualities save that of vegetable life. Its intension is small. "Geranium," on the contrary, covers comparatively few objects, but many qualities. Its intension greatly exceeds its extension. See *Jevons*, p. 37 sq.

18 : *a*. Explain the distinction between denotative and connotative terms.

On denotative and connotative terms, see *Whately*, B. 2, ch. 5, § 1; *Mill*, B. 1, ch. 2, § 5; *Atwater*, p. 46.

Bowen, *Logic*, p. 59, says: "It is a convenient use of language, though the words are sometimes used in another manner, to say that a word, or name, *connotes* the marks which make up its significance, and *denotes* the individual objects which make up these attributes." Fowler, *Deductive Logic*, p. 19, says: "A term is said to *denote* individuals, or groups of individuals; and *connote* attributes, or groups of attributes." This is the ordinary usage, simply because most terms have reference primarily to objects, and only secondarily to attributes. That to which a term has primary reference, it is said to *denote;* that to which it has secondary reference, it is said to *connote* (*cum-notare*).

18 : *b*. Illustrate the fact that every judgment may be read in the whole of extension, or the whole of intension.

The whole of extension alone was regarded as a "Logical whole" by the followers of Aristotle, who claimed that judgment consisted in referring individual objects to the class of objects to which they belonged.

By applying to a concept the term "Logical whole," the Aristotelian meant to deny its objective existence—to characterize it as merely a creation of the mind. The "whole of intension" he regarded as a "Metaphysical whole," which had objective and real existence. See *Thomson*, p. 101, note. Also, *Fleming*, who says: "Logically, the species is in the genus; metaphysically, the genus is in the species." That is: so far as our conceptions are concerned, the individual, or the lower class, exists in the class above it; so far as actual existence is concerned, the higher class exists only in the lower, the lower only in the individual.

Hamilton claims—and justly—that we may refer individual attributes to an intensive whole just as readily as individual objects to an extensive whole; hence, that the whole of the intension is just as logical as the whole of extension. According to Hamilton, every judgment may

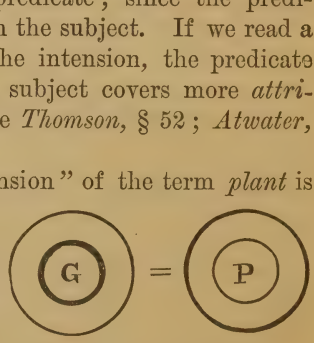
be read either in the whole of extension or the whole of intension. Thus, *Man is mortal,* may mean either, "Man is one of the class of beings possessing mortality" (*extension*); or, "The quality of mortality is one of those qualities which inhere in man" (*intension*). See the author's *Art of Expression,* p. 39.

See Mansel's *Aldrich,* p. 46 note, on the methods of expressing this two-fold relation which were available to the Greeks.

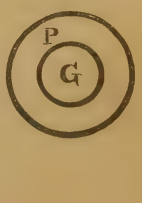
18 : *c.* Explain how the subject can be in the predicate, and the predicate, at the same time, in the subject.

In each judgment, both the subject and the predicate have two values—an extensive value and an intensive value. If we read a judgment in the whole of extension, the subject is in the predicate; since the predicate covers more *objects* than the subject. If we read a judgment in the whole of the intension, the predicate is in the subject; since the subject covers more *attributes* than the predicate. See *Thomson,* § 52; *Atwater,* p. 55.

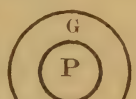
To illustrate: The "extension" of the term *plant* is large; its "intension," small. The term *geranium* precisely reverses these conditions. Using a heavy line for extension, and a light line for intension, the accompanying diagram will illustrate this point.



It will be seen that, so far as extension is concerned, the subject (geranium) is easily included in the predicate (plant). The geranium does, in fact, belong to the class of objects which "plant" denotes. Hence we have: G is in P.



With reference to intension, on the other hand, the predicate (plant) is easily included in the subject (geranium). The qualities of the plant (vegetable life) are, in fact, only found in combination with other qualities, such as distinctively characterize the geranium, the fern, the lichen, the oak, etc. Hence we have: P is in G.



19. Give Thomson's "Scheme of Conceptions in the three wholes of Extension, Intension, and Denomination."

We give from Thomson, *Laws of Thought*, p. 100, with some modification, the following table, which is designed to illustrate the meaning of the terms *summum genus*, *subaltern genus*, *infima species*; and also to show that as extension decreases from *summum genus* to *infima species*, intension increases, and *vice versa*:

Class.	Denomination.	Intension.	Extension.
Summum Genus	Body	Matter with form	Stone, plant, brute, man
Subaltern Genus	Living Body	" " " and life	Plant, brute, man
" "	Animal	" " " " and sensation	Brute, man
Infima Species	Man	" " " " " and reason	Man

The table also serves to illustrate the fact that *summum genus* and *infima species* are not absolutely fixed, but are simply the highest and lowest classes at any time recognized. Thus, we might recognize "matter" as a genus higher than the highest which Thomson recognizes; and "man," instead of being *infima species*, might be a subaltern genus subdivided into Caucasian and non-Caucasian. In a treatise on Zoölogy, "animal," one of Thomson's subaltern genera, would be *summum genus*. In a treatise on Ethnology, "man," Thomson's *infima species*, would be *summum genus*.

20. Explain the distinction between positive and privative concepts.

Positive concepts have substantial existence, and result from the generalization of the essential attributes which certain objects possess. Every *positive* implies a corresponding *privative*, which, in its origin at least, is the formal negation of its *positive*. Thus the positive concept "man" implies the privative concept "not-man"; the positive "kindness," its privative "unkindness." Though the privative concept is originally the mere negation of its positive, it may come to have—as in the case of the term "unkindness"—an independent existence. See *Thomson*, pp. 106–7. When we meet the term "unkindness," we do not first think of "kindness" and then negative our conception. The term has acquired a substantial meaning of its own—something midway between "kindness" and "cruelty." Cf. *The Political Adventures of Lord Beaconsfield*, p. 8, where the following passage occurs:

"His career has been described as demoralizing to the national character, and as lowering the standard and aims of English politics. We should say it was rather unmoralizing than demoralizing."

20 : *a*. What do you understand by the second sphere of the privative?

Every pair of positives and privatives divides between them the universe. Everything that exists is, for instance, either square or not-square. It is absurd, however, to think of the atmosphere as not-square—which it doubtless is—since we could not reasonably regard it as having *any* form. While the universe, then, is the *first* sphere of the privative, we recognize a *second* sphere of the privative in that department of being where the qualities of the positive might reasonably be expected. Thus,

"the universe" would be the *first* sphere, "bodies" (or matter with form) the *second* sphere, of "square" and "not-square."

Emphasizing the importance of the distinction between positive and privative concepts, Thomson, *Laws of Thought*, p. 113, says :

"Privative conceptions not only afford the means of varying the forms of thinking, by furnishing for every affirmative judgment equivalent negatives, and, for every negative, affirmatives, but they enter into and assist the higher processes of the reason in all that it can know of the absolute and the infinite. To attribute the properties of one or many individuals to every other of the same class is within the reach of the mere understanding, and the brute creation enjoy some share of it ; but from the seen to realize an unseen world, not by extending to the latter the properties of the former, but by assigning it attributes entirely opposite, is a prerogative of reason alone."

His statement is based (*ad finem*) on the Kantian distinction between the sphere of the understanding and that of the reason—the former being coincident with the sensuous, the latter with the supersensuous world.

21. What do you understand by Logical Division; and what are the principles upon which it must proceed?

"Logical Division is the enumeration of the various coördinate species of which a proximate genus is composed." (*Thomson*, § 55. Cf. *Jevons*, p. 105 sq.) It must proceed in accordance with the following principles :

1. The division must be made throughout upon one basis. Thus, if we have begun to classify man on the basis of color, we must adhere rigidly to that basis of classification. If we violate this principle, we shall be likely to violate both the principles which follow.

2. The dividing members must exclude each other ; that is, nothing must be included in one division which is also included in another division.

3. The dividing members must be equal, taken together, to the thing to be divided; a principle which simply requires that our task be carried to completion.

Care is also necessary that the divisions which we enumerate are strictly coördinate. As Thomson says: "A division where the species are not coördinate, although correct in other respects, would offer a bad arrangement for purposes of science. Thus, sciences should not be divided by a reader of Aristotle into 'Theoretical and practical, together with Poetry, Rhetoric, and Dialectic,' because the first two are divisions, and the last three are subdivisions of a genus that has been omitted, namely, the Poetic Sciences." (*Laws of Thought*, p. 106.)

This defect is especially common in Rhetorical Division, which is essentially similar to Logical Division, both in its nature and in the principles by which it is governed.

21: *a*. What significance is there in the statement of the scholastic Logicians: Divisio debet esse bimembris?

The bimembral division—or the division of a concept into two members, a positive and its corresponding privative; e. g., animal into vertebrate and invertebrate—is the only one which Pure Logic, in strictness, recognizes; being the only one which is *a priori*, having to do with the *form* and not the *matter* of thought. From one point of view, however, this division is practically useless, since we know nothing about the larger of the dividing members, save that it lacks the marks of the smaller. The bimembral or dichotomous division is, however, practically useful as a test of the thoroughness with which the principles of division have been applied in any given case. When our division conforms accurately to these principles, any one of the dividing members may be taken as a positive, and all the others grouped as its correspond-

ing privative. But when we attempt this bimembral reduction, our attention is frequently called to the fact that the members which we seek to reduce to A and not-A have not been formed in accordance with the principles of Division.

For example: If I have correctly classified a library on the topical basis, its various departments may be reduced to two—Poetry and not-Poetry. Now suppose that, thinking an original copy of Homer of more interest to the classical student than the student of poetry, I have put Homer in the department of Classical Literature. The moment I apply the bimembral test to my classification, Homer's works appear in the department of not-Poetry, and I am reminded that I have not proceeded throughout my task upon one principle of division. If, from similar considerations, I have assigned Homer both to the department of Poetry and to the department of Classical Literature, the bimembral test shows that I regard Homer's works as both Poetry and not-Poetry; that is, that my dividing members do not exclude each other, and that their sum will exceed the object to be divided.

This bimembral test is of very great practical advantage in Rhetoric. It is wise to go carefully over your material before beginning to write, making each head, in turn, a positive, and grouping all the others to form the corresponding privative. I recently heard a somewhat celebrated clergyman classify "the elements of carnality" under the following heads: 1. The thoughts; 2. The passions; 3. The intellect. The application of the bimembral test would have prevented this gross violation of the principles of division.

22. What do you understand by Logical Definition; and what are the principles upon which it must proceed?

1. Logical Definition (*definire*, to fix the *fines* or boundaries) consists, strictly speaking, in giving the genus and differentia of a species. E. g.: Man is a rational animal.

"Differentia + Genus = Species" when the Terms are used wholly in intension.

Hence, neither the *summum genus* nor the individual can, in Logical strictness, be defined; for we can not assign the genus to a *summum genus*, nor give a *specific* difference to the individual. The individual may, however, be differentiated by some accidental mark from the *infima species*, in accordance with the method by which the species is differentiated from the genus; as when we say, James Madison was the fourth President of the United States. Here the term "President of the United States" does not indicate a genus, and the attribute "fourth" is not sufficiently essential to constitute a "specific difference"; yet the method is *practically* that of Logical definition in its strict sense.

2. The term "definition" is more loosely used to denote the process of giving some mark, or combination of marks, which may serve to identify or explain the object to be defined. Thus Cicero, in the *De Oratore*, says: "Definition is some brief and circumscribed explication of those things [attributes] which characterize the thing [object] that we wish to describe."

This lower grade of definition (which is sometimes called Rhetorical Definition) must proceed in conformity with the following rules:

(1) The marks enumerated to define the object must be, so far as possible, essential. The definition, "Man is a featherless biped," is defective in this respect.

(2) The definition must be precisely adequate to the thing to be defined—neither too broad nor too narrow. Thus, "Words are the signs of thought" is too broad, since other things are the signs of thought. Again, "Words are the articulate signs by which an orator expresses his thought" is too narrow: there should be no limitation to the orator.

(3) The definition should not contain the name of the

object to be defined, or a synonym of that name: "Life is the sum of the vital forces" tion which does not largely incre

(4) The definition must be c ambiguous language. Presider happiness as "The ecstatic equi ents of consciousness," is defecti bert Spencer's definition of *Life* nation of heterogeneous changes, successive, in correspondence with external coexistences and sequences."

(5) The definition must not be negative when it can be positive. A negative definition is valueless unless you tell me all the things that the thing to be defined is not. Yet in dealing with the infinite and eternal, nothing better is possible.

Professor Huxley says that "the living body is a synthesis of innumerable physiological elements, each of which may be described in Wolff's language as fluid possessed of a vis essentialis and a solidescibilitas, or, in modern phase, as protoplasm susceptible of structural metamorphosis and functional metabolism." That's precisely what we have been maintaining all along.

3. Using the term "definition" still more loosely, we may accept as definition any process which helps one to identify or apprehend the object to be defined. Thus, we have definition by enumeration of the constituent parts of an object, as when I say (giving no marks, whatever), "The New England States are Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut"; by the substitution of names, as when I say, "Efflorescence means blossoming out"; by the substitution of narrative phrases, as when I say, "H_2O is the symbol that chemists make use of to designate water"; etc., etc. See *Thomson*, §§ 70, 71; *Atwater*, p. 79.

Division and definition are correlative processes. Each assists the other. Each implies the other. Though differing essentially in their nature, the two processes go on at the same time. See *Thomson*, p. 108; *Atwater*, p. 81.

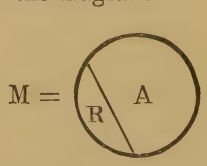
Rhetorical definition—or the second kind of definition recognized above—is of the utmost practical importance.

To make a thoroughly good definition is the hardest task that the student undertakes.

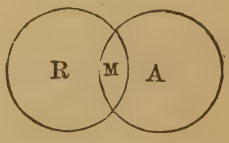
Hamilton refers the entire subject of definition to Applied Logic, on the ground that it requires us to take cognizance of the matter, no less than the form, of thought. *Thomson* discusses it under Conception, p. 107 sq., under Judgment, p. 138 and p. 142 sq., and also under Applied Logic, p. 269 sq.—a fact which seems to vindicate Hamilton's course. Logical Definition, in the strict sense of the term, is certainly not out of place under Pure Logic, however, and we have preferred to say all that we have to say respecting definition here. On the distinction between nominal and real definition, see *Fleming*, p. 128; *Hamilton*, p. 343.

22 : *a*. Illustrate the fact that genus and differentia are really two concurrent genera.

Instead of regarding the differentia as peculiar to the species defined (which it must be within the genus of which it cuts off a segment, else there is no definition), we may regard the differentia as itself a genus which serves to define an object by intersecting or overlapping another genus. Thus, instead of representing "Man is a rational animal" by the diagram



we may represent it by this diagram :



Here, the distinction between genus and differentia vanishes. Man is defined by the concurrence of two genera,

and we may say that "animal" differentiates him from "rational," just as truly as that "rational" differentiates him from "animal." We recognize here the fact that other beings besides man—e. g., good and evil angels—possess rationality. See *Atwater*, pp. 77, 78; *Hamilton*, p. 106; *Thomson*, p. 137.

23. What is meant by a logical judgment; what by a proposition; what by the terms of a judgment?

A logical judgment is the mental affirmation of agreement or disagreement between two concepts, or an intuition and a concept. A proposition is a judgment expressed in words. The terms (*termini*, boundaries) of a judgment are the two notions compared; the terms of a proposition are the subject and the predicate.

23 : *a*. What is meant by primitive, or psychological, as distinguished from logical, judgment?

Whenever an object is presented to our consciousness, we judge that it exists—we affirm its agreement with the concept existence. Judgments of this nature, which predicate of an object existence merely, and predicate existence as the result rather of intuition than of a process of thought, are called by *Atwater*, p. 53, "primitive"; by *Mansel*, p. 63, sq., "psychological" judgments. Cf. Bascom, *Comp. Psychology*, p. 198, on "associative judgments."

24. What is meant by the Quantity of a judgment; and how are judgments classified under this head?

By the Quantity of a judgment we mean, the extent to which its subject term is employed in predication. If the whole of the subject is employed—e. g., "*All* men are mortal"—the judgment is said to be "universal"; if but a part of the subject is employed—e. g., "*Some* men are rascals"—the judgment is said to be "particular."

"Singular" judgments, in which the subject is an

individual—e. g., "*This* man is wealthy"—are also recognized; but need not, for logical purposes, be discriminated from "universal" judgments, since they introduce the whole of the subject, though that subject is but a single person or thing. "Indefinite," "numerical," and "plurative" judgments are also recognized by some logicians.

24: *a.* What view does Hamilton take of particular judgments?

Hamilton contends that particular judgments introduce the whole subject, but that that subject is indeterminate or indefinite. For example: in the judgment "Some lakes have an outlet," he would regard the phrase "some lakes" not as a part of the larger term "lakes," but as constituting a new term, the extension of which is undetermined, but the whole of which (whatever its extension may prove to be) is included in the affirmation.

Hamilton's classification of judgments (see *Logic*, p. 171 sq.) is as follows:

JUDGMENTS.
- I. *Mental.*
  - 1. Determinate
    - a. Universal.
    - b. Singular.
  - 2. Indeterminate
    - c. Particular.
- II. *Verbal.*
  - 1. Predesignate [with signs].
  - 2. Preindesignate [without signs].

25. What is meant by the Quality of judgments; and how are judgments classified under this head?

By the Quality of a judgment, we understand the agreement or disagreement of its subject and predicate. With reference to quality, judgments are classified as "affirmative" or "negative." In a negative judgment, the negation may directly modify the copula in expression, or it may not—e. g., "This *is not* an animal"; "This is *non-animal*"; "*Not this* is an animal"; "This is *no* animal"—but some negation must modify the copula in thought. It should be borne in mind that a prop-

osition may embody a negative which does not modify the copula in thought, and hence leave the judgment an affirmative one. E. g.: "All that glitters is not gold"; where the negative, though apparently modifying the copula, really modifies the subject—the thought being "not all that glitters is gold." We must carefully discriminate between those judgments which are negative in fact and those which are negative only in appearance. See *Thomson*, § 75.

26. In what sense does Thomson use the word Relation with reference to a judgment; and how are judgments classified with reference to Relation, using the word in this sense?

The Doctrine of Relation—according to *Thomson*, § 68 and § 73, first paragraph—merely takes cognizance of the question whether the predicate of a judgment is or is not coextensive with the subject. Under this head judgments are classified as "substitutive"—in which the subject and predicate *are* coextensive, and can change places (e. g., "Sodium Chloride is common salt"); and "attributive"—in which the subject and predicate are *not* coextensive, and can not change places (e. g., "Man is an animal").

26: *a*. What is the ordinary use of the term Relation?

The Doctrine of Relation, as most logicians have employed that term, has reference to the discrimination of judgments into "categorical" and "conditional"—terms which will be subsequently explained.

27. Enumerate and explain the four predicable-classes recognized by Aristotle, and show how they may be reduced to two.

According to Aristotle, every judgment indicates either the *genus*, or the *property*, or the *definition*, or an *accident*

of its subject. Into one of these four classes all predicates must fall.

The *genus* always belongs to the subject, but belongs to other subjects as well; e. g., "Man is an *animal.*"

The *property* always belongs to the subject, and to the subject only (that is, it is *proprius* to it), without being the mark or attribute which we should choose to explain the very nature of the subject; e. g., "Man is a *laughing animal.*"

The *definition* is the mark, or marks, which would explain the very nature of the subject, and of course belongs to the subject only; e. g., "Man is a *rational animal.*"

The *accident* is an attribute which may or may not belong to the subject, and which belongs to other subjects as well; e. g., "The man is *sick.*"

Of these four classes of predicables, the *definition* and the *property* belong to the subject only, and hence can change places with it. We may say, "A rational animal is man," just as truly as "Man is a rational animal."

The *genus* and the *accident* do not belong to the subject only, and hence can not change places with it. To say "An animal is man" is a very different thing from saying "Man is an animal."

In view of this fact, Aristotle's four classes of predicables may be reduced to two: the first (including *definition* and *property*) being convertible, or substitutive; the second (including *genus* and *accident*) being inconvertible, or attributive. See *Thomson*, § 69.

28. What is the distinction between a categorical and a conditional judgment?

A categorical judgment is one in which some concept, or intuition, is directly and unequivocally said to belong,

or not to belong, to some other concept. A conditional judgment is one in which the affirmation is made to depend on the truth or falsity of some other judgment. To illustrate: The categorical judgment says, "A is B," or "A is not B"; the conditional judgment says, "If C is D, A is B."

The term "categorical," as used by Aristotle, has reference only to affirmative judgments. His followers extended the significance of the term, so as to cover negatives as well.

28: *a.* State and illustrate Hamilton's Classification of Conditionals.

Hamilton's Classification of Conditionals is:

- JUDGMENTS.
  - CATEGORICAL.
    - *Aff.*: "A is B."
    - *Neg.*: "A is not B."
  - CONDITIONAL.
    - *Hypothetical* (condition in subject): "If A is, B is."
    - *Disjunctive* (condition in predicate): "A is either B or C." *
    - *Hypothetico - Disjunctive* (condition in both subject and predicate): "If A is B, Q is either C or D."

Whately makes the terms "conditional" and "hypothetical" change places, and calls the hypothetico-disjunctive judgments dilemmatic, trilemmatic, or polylem-

* The conditionality of this judgment—which has sometimes been questioned—may be shown by throwing it into the form: "If A is not B, it is C."

matic, according to the number of alternatives which they present. Hamilton's nomenclature is decidedly preferable.

28 : *b*. Illustrate the assumed possibility of reducing conditionals to the form of categoricals, and indicate what value is to be attached to it.

That conditional judgments can be reduced to the form of categorical judgments, is affirmed by *Thomson*, § 73, and *Atwater*, p. 102 sq., who would, for example, turn the judgment "If A is B, C is D," into "The case of A's being B is a case of C's being D"; and the judgment "A is either B, C, or D" into "The possible cases with reference to A are B, C, and D."

This reduction is certainly feasible, so far as the form of words is concerned, and it may have its advantages in simplifying the discussion of the process of reasoning; but it does not affect the form of thought: it does not eliminate the element of conditionality, but simply expresses it in less usual and more barbarous terms. See *Hamilton*, p. 168 sq.

29. What do you understand by the distribution of a term in Judgment?

When the whole of a term, whether that term be subject or predicate, is included in any judgment which we form, that term is said to be "distributed"; when the whole of the term is *not* included, it is said to be "undistributed." Thus, *universal* judgments distribute the subject; *particular* judgments do not. The expressions "distributed" and "undistributed" are generally used, however, with reference to the predicate only —since the expressions "universal" and "particular" serve to denote the distribution or non-distribution of the subject.

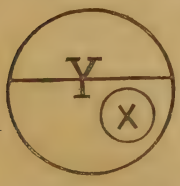
29 : *a*. State and explain the Aristotelian dictum concerning the distribution of the predicate.

Respecting the distribution of the predicate, the Aristotelian logicians laid down the dictum that "All negative judgments, and no affirmative judgments, distribute the predicate."

As the Aristotelian logicians never expressed the quantity of the predicate in words, some such dictum was necessary in order to determine how much of Y was meant when one said "X is Y," etc., etc.

The ground of this dictum with reference to affirmatives was that, judging in the whole of Extension (and to the whole of Extension alone the Aristotelian logicians restricted their judgments), "X is Y" meant: X is included in Y, or is some *part* of Y. Hence, in an affirmative judgment, like "X is Y," the predicate could not be distributed—one could not be thinking of the *whole* of Y.

With reference to negative judgments, the ground taken was, that if we say "No X is Y," yet regard Y as *undistributed*, or do not look at the whole of Y, we exclude X from that part of Y only which is included in our judgment, and it may, for aught we know, be included in that other part of Y which our judgment does not contemplate; in which case it would not be true that "No X is Y." To illustrate: Looking only at the upper part of the accompanying diagram, we see no X, and form the judgment "No X is Y"; but some one else, looking at the lower part of the diagram, detects X, and forms the judgment "X is Y," which (viewed from the Aristotelian standpoint) contradicts the judgment previously formed.



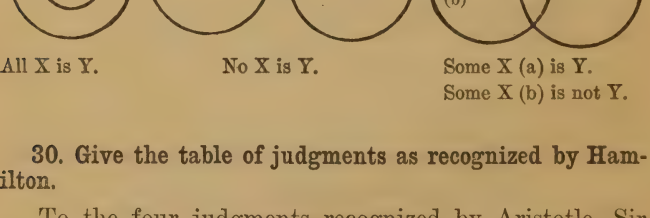
Hence, unless in a negative judgment one surveyed the whole predicate, and made sure that the subject was excluded from it, he could not, according to the Aristotelian logicians, be sure of any valid negation. See *Thomson*, p. 157.

29 : *b*. Give the Aristotelian table of judgments as determined by this dictum.

In accordance with the above dictum, the Aristotelian logicians—down to and including Whately—recognized the following as the only valid forms of judgment :

Sign.	*Terms.*	*Quant.*	*Qual.*	*Rel.*
A.	All X is Y.	Univ.	Aff.	Attrib.
E.	No X is Y.	Univ.	Neg.	Subst.
I.	Some X is Y.	Partic.	Aff.	Attrib.
O.	Some X is not Y.	Partic.	Neg.	——

These different judgments may be illustrated by the following system of circular diagrams devised by Euler :



30. Give the table of judgments as recognized by Hamilton.

To the four judgments recognized by Aristotle, Sir William Hamilton has added four other judgments, covering all the possible combinations of two terms. [2 Terms × 2 Quantities × 2 Qualities = 8 forms of judgment.]

These added Hamiltonian judgments are :

Sign.	*Terms.*	*Quant.*	*Qual.*	*Rel.*
U.	All X is all Y.	Univ.	Aff.	Subst.
Y.	Some X is all Y.	Partic.	"	"
η.	No X is some Y.	Univ.	Neg.	"
ω.	Some X is not some Y.	Partic.	"	"

30 : *a*. State and illustrate the principle on which Hamilton made his additions to the Aristotelian judgments.

It will be noticed that in all his added judgments Hamilton violates the Aristotelian dictum respecting the distribution of the predicate ; since both of his affirmative judgments, and neither of his negative judgments, include the whole of Y. In opposition to this dictum, Hamilton contends that both the subject and the predicate of a proposition have a determinate quantity in thought (a fact which is seriously questioned by some) ; and that this quantity ought, upon demand, at least, to be expressed in language. He further claims that, when the quantity of the predicate is thus definitely expressed, we may have a universal predicate in an affirmative judgment, or a particular predicate in a negative judgment, just as well as those predicates prescribed by the scholastic dictum.

For example : In the Aristotelian judgment A, we mean to affirm that all X is *included in*, or is *a part of*, Y. Now, if we say what we mean—that is, "All X is *some* Y"—it leaves us free to form the judgment U, "All X is *all* Y." Similar reasoning with reference to I leaves us free to form the judgment Y, "Some X is all Y."

Again, in the negative judgment E, we mean to exclude the whole of X from any part of Y ; and, to express

our thought fully, should say, "No X is *any* Y." Then we are free to form, if we choose, the judgment η, "No X is *some* Y." Likewise, in the negative judgment O, we should say what we really mean, "Some X is *not any* (or is no) Y." Then we are at liberty to say, if we see occasion to, "Some X is *not some* Y"—using the judgment ω.

To sum up in a single sentence the results of our discussion: The principle on which Sir William Hamilton adds the judgments U, Y, η, and ω to the four judgments recognized by Aristotle, is that of "THE THOROUGH-GOING QUANTIFICATION OF THE PREDICATE." This is the corner-stone of what is called "The New Analytic of Logical Forms."

Hamilton's "thorough-going quantification of the predicate" is, however, facilitated by the interpretation which he gives to the copula in a judgment. While the Aristotelian reads a judgment only in extension, and interprets "is" to mean "*is included in*," Hamilton reads a judgment either in extension or intension, and, to cover both, interprets "is" to mean "*is*." Between subject and predicate, according to him, the sign of equality may always be placed, and every judgment becomes substitutive—a point which will be better appreciated when we come to discuss Logical Conversion.

While, throughout this discussion, I have used the signs which Thomson—in common with most logicians—employs to designate the Hamiltonian judgments, I prefer the designation adopted by the later advocates of the "New Analytic," according to whom the judgments would be classified as follows:

	Affirmative.		Negative.	
Toto-total.	AA.	All X is all Y.	No X is any Y.	EE.
Parti-partial.	II.	Some X is some Y.	Some X is not some Y.	OO.
Toto-partial.	AI.	All X is some Y.	No X is some Y.	EO.
Parti-total.	IA.	Some X is all Y.	Some X is no Y.	OE.

31. What value is to be attached to the Hamiltonian judgments U and Y?

The Hamiltonian judgments U and Y have been so generally accepted, that Thomson utterly neglects to refer them to their author. But while all modern logicians agree in accepting these judgments, and while there is no question that they are actually formed, attention should be called to their peculiar character. Possibly, it was from the consideration of this peculiarity, and not from mere oversight, that Aristotle excluded them from his list. "A judgment," Thomson tells us, "is an expression that two notions can or can not be reconciled"; but, in the judgments U and Y, we do not have two notions —we have the same notion expressed in different terms. For example: "Sodium Chloride is common salt"; "All man is all rational animal." *

In the last instance, we simply predicate agreement between the symbolic and the notative term for the same concept. I would not, for this reason, say that U and Y are not valid judgments, although even Hamilton's definition of judgment does not precisely cover them. They are *explicative* judgments, or "semi-identical propositions." See *Thomson*, § 81; *Atwater*, p. 101. *

To mark a positive increase in our knowledge (or to mark our failure in this direction—which is nearly as instructive as success) we must make use of the Aristotelian judgments, which refer, or refuse to refer, a class of objects to a higher class. These judgments—which may be styled "ampliative," in opposition to "explicative"—serve to mark our advances in scientific classification. The Hamiltonian judgments U and Y—giving us merely equivalent expressions for the same notion—serve only to

* I find the point here taken (in 1868) confirmed—even to the first illustration—by Bain, *Deductive Logic*, p. 88.

* Note the difference between "explicative" + "tautological" judgments, E.g. "Sodium Chloride is common salt" + "A spirit is a spirit".

define and clarify knowledge already acquired. See the author's *Art of Expression*, p. 39.

32. What objections are urged to the Hamiltonian judgments Eta and Omega?

The judgments η and ω have been very generally rejected, though Bowen (*Logic*, p. 132 sq.) strenuously defends them. The common—and, indeed, the valid—objections to these judgments is: that, though they are conceivable, they are not included in those actual forms of thought with which alone Logic is concerned. See *Thomson*, § 79 and note.

Thomson's objection to η, that it "has the semblance only, and not the power, of a denial," seems to me not well taken. The judgment "No birds are some animals" (i. e., quadrupeds) *has* the power of a denial. The judgment "All birds are some animals" (i. e., bipeds) does not really contravene it; nor is it really "a judgment of the affirmative kind from the same terms." The mind is thinking of a different "some" in the two judgments.

To say "No planets are some stars" (η) is certainly a practicable and efficient denial, if one chooses to employ it; but most persons would instinctively prefer the equivalent expression, "Some stars are not planets." When we have before us two concepts of equal extent—one positive, the other negative—we naturally make the positive, rather than the negative, the subject of our proposition.

In defense of the judgment ω, Hamilton argues with great ingenuity. See *Thomson*, p. 164.* His judgment,

* "To my objection that the two weaker negatives have never occurred in the examination of logical examples, Sir William Hamilton replies in the *Athenæum* (in a letter dated February 25, 1851) as follows: 'The thorough-going quantification of the predicate (on demand), in its appliance to negative propositions, is not only allowable, is not only systematic, is not only useful—it is even indispensable. For to speak of its very weakest form, that which I call parti-partial negations, *Some—is not some*;—this (besides its own uses) is the form which we naturally employ in dividing a whole of any kind into parts: *Some A is not some A*. And is this form—that, too, inconsistently—to be excluded from Logic? But again (to prove *both* the obnoxious propositions summarily and at once), what

"Some A is not some A" (or, in terms, "Some trees are not some trees"), would, however, more naturally be expressed by E instead of ω: "No A is any B"; "No elms are any oaks."

The conclusion of his syllogism, in which he proves both the obnoxious propositions summarily and at once, can only mean, "Rational animals are not irrational animals"—which is grossly tautological. Thomson's objections to ω—like his objections to η—are not beyond question. "Some X is not some Y" may be "true, whatever terms X and Y stand for" (*Thomson*, p. 163); but is *not* true, whatever parts of X and Y "some" denotes. "This is not the salt that I bought of Jones" evidently denies something, though it is reducible to the obnoxious form "Some is not some" (ω). "Some X is not some X" would, however, be its fair equivalent rather than "Some X is not some Y"—which, in connection with Hamilton's "Some A is not some A," where he should have given us "Some A is not some B" (see note), may suggest that

objection, apart from the arbitrary laws of our present logical system, can be taken to the following syllogism?—

All man is some animal;
Any man is not (*no man is*) *some animal;*
Therefore some animal is not some animal.

Vary this syllogism of the third figure to any other; it will always be legitimate by nature, if illegitimate to unnatural art. Taking it, however, as it is—the negative minor premise, with its particular predicate, offends logical prejudice. But it is a proposition irrecusable, both as true in itself, and as even practically necessary. Its converse, again, is technically allowed; and no proposition can be right of which the converse is wrong. For to say (as has been said from Aristotle downward) that a particular negative proposition is inconvertible—this is merely to confess that the rules of logicians are inadequate to the truth of Logic and the realities of nature. But this inadequacy is relieved by an unexclusive quantification of the predicate. A toto-partial negative can not, therefore, be refused. But if the premises are correct, so likewise must be the conclusion. This, however, is the doubly obnoxious form of a parti-partial negative:

Some animal (man) *is not some animal* (say, brute).

Nothing, it may be observed, is more easy than to misapply a form; nothing more easy than to use a weaker, when we are entitled to use a stronger proposition. But from the special and factitious absurdity thus emerging, to infer the general and natural absurdity of the propositional form itself—this is, certainly, not a logical procedure.'"

the judgment ω is valuable, if at all, in discriminating parts of the same concept, rather than parts of different concepts.

32: *a.* In what sense does Hamilton use the word "some," and what bearing does this use of the word have on these commonly rejected judgments?

The contemptuous rejection of the Hamiltonian judgments generally results from a misconception of the meaning which Hamilton attaches to the word "some." This word may mean, "Some at least, perhaps all"—in which sense the Aristotelian logicians used it; or it may mean, "Some at most, not all." It is in this latter, or semi-definite, sense that Hamilton employs the word "some" in quantification. See *Logic*, p. 531. Thus, when the Aristotelian says, "Some X is Y," he means, "Some—possibly all—X is Y." When Hamilton says, "Some X is Y," he means, "Some — certainly not all — X is Y."

Hamilton's use of the word "some" is, according to Mr. Grant White—*Words and their Uses*, p. 251 sq.—that which is sanctioned by the derivation of the word and the usage of the best writers. According to White, the word "some" denotes "an indeterminate quantity or number, considered apart from the whole existing number." Cf. the author's *Art of Expression*, p. 61.

Attaching to the word "some" this semi-definite or Hamiltonian sense, I do not see why the judgment η ("No X is some Y") is not valid. If it is true that A = B, then it should be true that B = A. If "Some Y is no X" has the power of a denial, it would be difficult to show how it loses that power by simply reversing the order of its terms. See note on Topic 32.

33. Illustrate the assumed possibility of reducing the Hamiltonian judgment Y to U.

It may be remarked, before dismissing the subject under discussion, that the judgment Y ("Some X is all Y") is open to still further objection. By "Some X' Hamilton means to indicate an indeterminate part of the wider term X—of which indeterminate part, be it more or less, the whole is taken. See Topic, 24 : *a*. "Some X is all Y" means, then,

$$\text{(All) (Some X)} = \text{all Y}.$$

Now it is claimed that this double predesignation of X is still more unnatural in thought than in language; that, instead of regarding "Some X" as a part of the wider term X, we may more naturally regard it as a new term. Let "Some X" = Z. Substituting this expression for "Some X," the equation

$$\text{(All) (Some X)} = \text{all Y}$$

becomes

$$\text{All Z} = \text{all Y},$$

which is the judgment U.

If this reasoning be accepted, we may reduce the valid Hamiltonian judgments to one—namely, U—which is, as we have seen, a semi-identical proposition, or a definition, rather than a judgment.

I am, however, inclined to question the significance of this reduction—regarding the partitive judgment "Some X is all Y" as essentially different from the non-partitive judgment "All Z is all Y."

34. What do you understand by the Modality of Judgments; and what is Aristotle's three-fold division under this head? What value is to be attached to this division?

By the "Modality" of judgments, we understand "the degree of certainty with which a judgment is made and maintained."

Aristotle divides judgments into *problematic*, which are matter of mere opinion (e. g., "It will probably rain to-morrow"); *assertory*, which are sure to him who holds

Jevons p. 69 + 91. ; Thomson § 76 + 118

judgments are as to Aristotle the results of Opinion, of Belief, or of Science. i.e. Problematical, Assertory, or Demonstrable."

them, but not susceptible of demonstration (e. g., "America is, in general culture, superior to England"); and *apodeictic*, or demonstrative, which are not only sure to him who makes them, but to all who are of sound mind and able to appreciate their statement and defense (e. g., "The sum of the angles of a triangle is equal to two right angles").

The fact that *Thomson*, § 118,* makes a nine-fold division under the head of Modality, suggests that no such clear and sharp distinction as Aristotle attempts can be maintained. "Problematic" judgments shade into "assertory" judgments by endless variations. Moreover, that which is matter of doubt to one person may be matter of assertion to another, and matter even of demonstration to a third (e. g., "that the square described on the hypothenuse of a right-angled triangle is equal to the sum of the squares of the two other sides").

The Aristotelian division is interesting and important as underlying the distinction between "moral" and "demonstrative" reasoning, or between "proof" and "demonstration"; which differ in their sphere, and in the nature of their evidence, rather than in their certainty to a reasonable being. "Demonstration" consists in tracing a statement back, step by step, till it is seen to rest upon some self-evident truth. Its sphere is pure science, and especially the Mathematics. "Proof" consists in adducing, in support of a statement, considerations which may reasonably induce, but do not absolutely compel, belief. Its sphere is human knowledge in general. "Proof," in its legitimate sphere, may be as conclusive as "demonstration." You are as certain, doubtless, that you exist, as you are that the sum of the angles of a triangle is equal to two right angles. Yet the latter fact is susceptible of "demonstration," the former is not.

Nothing is more stupid than to ask for "demonstra-

* The amt of belief we have in our judgments has been called its Modality, as being the mode in which we hold it for truth. Degrees of (M. are a) possible, b) doubtful, c) probable, d) morally certain for the thinker himself, e) for a class or school, f) for all, g) physical, certain, within a limit, h) without limitation i) Mathematically certain, where doubt cannot be admitted

tion" where only "proof" is possible—though this is what religious skepticism commonly asks. As Coleridge says (*Aids to Reflection*): "The man who will believe nothing but by force of demonstrative evidence is not in a state of mind to be reasoned with on any subject."

Dr. Archibald Alexander says: "When all the evidence relating to a proposition is before the mind, that is true which is easiest to be believed; because it is easier to believe with evidence than against it." To the same effect is Greenleaf's statement (*Greenleaf on Evidence*) that "the subordinate rules of evidence are silenced by the most transcendent and universal rule that, in all cases, *that* evidence is good than which the nature of the subject presumes no better to be attainable."

34: *a.* Why is Modality generally referred to Applied Logic?

Whether a judgment be problematic, assertory, or demonstrative, its *form* will be the same. It must be susceptible of reduction to "X is Y," or "X is not Y," which afford no hint of the modality of the judgment. As Hamilton says (*Logic*, p. 183): "Whatever can not be stated by A, B, and C is not of logical import: and A, B, and C know nothing of the necessary, impossible, and contingent." The distinctions under this head are founded either on the mental culture of the individual, on his opportunities for observation, or on the matter with which he deals. In either case, Modality must be excluded from Pure Logic.

35. Define Reasoning, and distinguish between Immediate and Mediate Inference.

Reasoning consists in deriving one judgment from another judgment or other judgments. When we derive

one judgment from another judgment directly and without any intervening process (as when from the judgment "All men are mortal," we infer that "Some mortal beings are men"), our inference is said to be *im-mediate.* When we derive one judgment from another judgment only by positing a third (as when we infer from the judgment "This liquid contains arsenic" that "This liquid is poisonous," by laying down the third judgment, "All liquids containing arsenic are poisonous"), our inference is said to be *mediate.*

35 : *a.* Enumerate the various kinds of Immediate Inference.

The various kinds of Immediate Inference are :

(1) By Opposition.
(2) By Conversion.
(3) By Privative Concepts.
(4) By Added Determinants.
(5) By Summation of Predicates.
(6) By Disjunctive Judgments.
(7) By Interpretation.

These different kinds of Immediate Inference will be discussed in the order in which they are named.

36. Define Logical Opposition, and give the classification under this head.

Logical Opposition is that difference existing—either with reference to quantity, quality, or relation—between two judgments which have the same subject and predicate, by virtue of which, when one judgment is affirmed or denied, we are able *immediately* to make some inference respecting the truth or falsity of its opposite.

Under this head the following classification may be accepted :

OPPOSITION.
- TRUE. (*Quality.*)
  1. Contradictory. (No alternative.)
  2. Contrary. (An alternative.)
- FALSE. (*Quantity, Relation, Name.*)
  1. Subaltern. (Quantity merely.)
  2. Inconsistent. (Relation merely.)
  3. Sub-contrary. (Name merely.)

36 : *a*. Explain the nature of each kind of Opposition enumerated in this classification; the judgments between which it exists; and the inferences deducible from it.

Contradictory opposition exists between an affirmative and a negative judgment which are so related that, when we affirm one, we must deny at least so much as the other; and *vice versa*. That is, between A and O and between E and I according to Aristotle; between E and I only, according to Thomson.

Thomson says: "Other writers describe A and O as contradictories; but the fact is that we can not tell from the removal of O whether we ought to replace it by A or U. Let the judgment O, 'Some men are not rational animals,' be removed, i. e., its truth denied, and that removal will not establish A, 'All men are (some) rational animals.' A third judgment is possible, namely, that 'All men are *all* rational animals'—the only rational animals there are; and which of these two is to apply, can not be inferred from the [denial of] O, but must be ascertained from the facts in the case." (*Laws of Thought*, pp. 178–179.)

Atwater (*Logic*, p. 112, note) argues against the rejection of the contradictory opposition between A and O; but the considerations which he suggests would rather lead us to regard the opposition between E and I as "contrary," than to regard that between A and O as "contradictory." It is to be remarked that in the case of E and I we have a "toto-total" negative ("*None* is *any*") op-

posed to a "parti-partial" affirmative ("*Some* is *some*"). That is, the two judgments E and I are as widely separated as possible, in *quantity* as well as in *quality*. In the case of A and O, this is not true. There, we have a "toto-partial" affirmative ("*All* is *some*") opposed to a parti-total" negative ("*Some* is *none*"). The opposition between A and O is, clearly, not so great as between E and I. The Hamiltonian U ("*All* is *all*") and ω ("*Some* is not *some*") would stand in strictly correspondent relation to E and I.

Contrary opposition exists between an affirmative and a negative judgment which are so related that we have an alternative judgment open to us, and both the opposing judgments may be false, though they can not, at the same time, both be true. This kind of opposition exists, for example, between A and E. That "All X is Y" and that "No X is Y" can not both be true; but the truth may be (I) that "Some X is Y" and (O) that "Some X is not Y." See Topic 10 in this treatise; and, especially, Bain, *Deductive Logic*, p. 92 sq.

Subaltern opposition exists between two judgments of the same quality, of which one may be regarded, by virtue of the inferior extension of one or both of its terms, as being included in the other; for instance, between A and I. The including judgment is called the "subalternant"; the included judgment, the "subalternate." To affirm the subalternant, affirms the subalternate. E. g.: If "*all* X" is included in Y, "*some* X" must be. To deny the subalternate, denies the subalternant. E. g.: If "*some* X" is not included in Y, "*all* X" can not be included in Y. But nothing follows from denying the subalternant, or affirming the subalternate. Though "*all* X" is not included in Y, "*some* X" may be. Though "*some* X" may be included in Y, "*all* X" need not be.

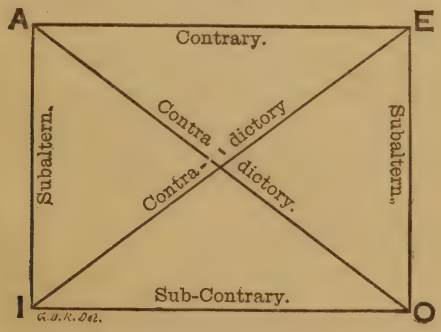
Inconsistent opposition exists between two judgments

of the same quality which can not both be true at the same time; and is especially marked where one judgment is substitutive and the other attributive; e. g., between A and U. See *Thomson*, pp. 179–180.

Sub-contrary opposition, or the opposition which exists between two subalternate judgments of different quality, is merely nominal. Between the Aristotelian I and O (sub-contraries) there is a seeming contradiction, but a possible agreement. If "some X" be Y, "some X"—that is, some other part of X—may, at the same time, not be Y. Reading these judgments in the Hamiltonian sense, if it be true that "Some X is Y," it *must* be true that "Some X is *not* Y." The one statement is the necessary complement of the other.

In regard to the opposition—called sub-contrary—between Y and O, the truth of Y implies the truth of O; but Y and O may both be false—the truth being, for instance, U. See *Thomson*, p. 182.

37. Give the diagram which illustrates Logical Opposition, embracing the judgments A, E, I, and O.



37: *a*. Discuss the diagram illustrating Logical Opposition from the Aristotelian point of view.

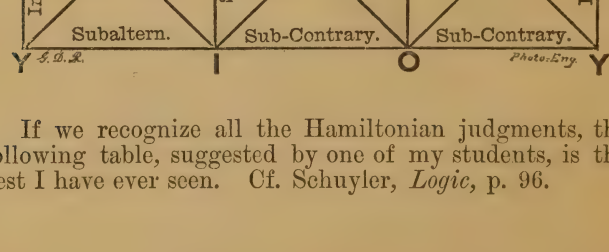
Reading all of these judgments in the Aristotelian sense, the effect, on each of the others, of alternately affirming and denying A, E, I, and O, is as follows:

1) To affirm A, affirms I and denies O and E.
2) " " E, " O " " I and A.
3) " " I " " E [possibly O].
4) " " O " " A [possibly I].
5) " deny A " O [possibly E].
6) " " E " I [possibly A].
7) " " I denies A, affirms E and O.
8) " " O " E, " A and I.

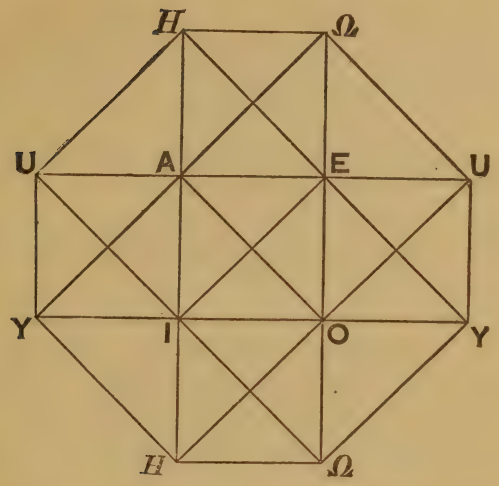
Cf. Schuyler, *Logic*, p. 34.

37: *b*. Give diagrams of Opposition which introduce the Hamiltonian judgments.

If we recognize six forms of judgment only, the following table will serve to illustrate Opposition:



If we recognize all the Hamiltonian judgments, the following table, suggested by one of my students, is the best I have ever seen. Cf. Schuyler, *Logic*, p. 96.



37 : *c.* Discuss the table of Hamiltonian Opposition.

The minute discussion of the table of Opposition from the Hamiltonian point of view is comparatively profitless; since, interpreting the copula and the word "some" in the Hamiltonian sense, most of the judgments become simply *inconsistent* with every other judgment. For example: to affirm A no longer affirms I; to affirm E no longer affirms O; but to affirm I or Y does affirm O; to affirm O affirms I or Y. Still, to attempt the discussion affords a very pretty mental gymnastic.

38. What is meant by Logical Conversion? Convert the judgments A, E, I, O, U, Y.

Logical Conversion consists in the transposition of the subject and predicate in a proposition. By this process, as simplified by modern logicians,

A, "All X is some Y," becomes Y, "Some Y is all X."
E, "No X is any Y," becomes E, "No Y is any X."

I, "Some X is some Y," becomes I, "Some Y is some X."
O, "Some X is no Y," becomes η, "No Y is some X."
U, "All X is all Y," becomes U, "All Y is all X."
Y, "Some X is all Y," becomes A, "All Y is some X."

On the significance of immediate inferences of this nature, see *Thomson*, p. 183.

38 : *a*. Show how Hamilton has simplified the process of Conversion.

It will be noticed that, in order simply to convert the Aristotelian judgments A and O—as is done above—we are obliged to recognize the Hamiltonian judgments Y and η. It is one of the strongest arguments for the acceptance of the added Hamiltonian judgments, that only by accepting them can we do away with the cumbrous, unnatural, and inadequate system of conversion imposed by the Aristotelian dictum. Unless we are prepared to maintain that to transpose the members of an equation destroys the equation, we must accept Y and η when the predicate is explicitly quantified and the copula read in equivalence. See note upon Topic 32.

38 : *b*. Explain the three kinds of Conversion recognized by the old logicians.

The old logicians recognized three kinds of Conversion.

(1) *Simple*, which, as has already been explained, consisted in the mere transposition of terms, but which they employed only in the case of E and I.

(2) *By Limitation* (*conversio per accidens*), which was employed in the case of the judgment A, where "simple conversion"—yielding the judgment Y—would violate the Aristotelian dictum respecting the distribution of the predicate. To avoid this result, the predicate was changed in the *conversa* from universal to particular. Thus A, "All men are [some] mortals," was converted into I, "Some mortals are [some] men."

This method of conversion is obviously defective, in that we can not by reconversion regain the original judgment.

(3) By *Contraposition*, which was employed in the case of the judgment O, which, simply converted, would yield η, and so violate the Aristotelian dictum; and which could not be converted by limitation without distributing a term in the *conversa* which is not distributed in the *convertend*. Take, for example, a judgment in terms: "Some quadrupeds are not [any] horses." This judgment, converted simply, would yield η, "No horses are some quadrupeds," violating the dictum. Converted by limitation, it would yield, "Some horses are not quadrupeds," i. e., not any quadrupeds—distributing a term in the *conversa* which was not distributed in the *convertend*, and involving manifest absurdity. Hence the method of "conversion by contraposition" was devised, which consists in transferring the negation from the copula to the predicate, and thus transforming the judgment O to a judgment I, which could be simply converted. Thus, instead of O, "Some quadrupeds are-not horses" (*non sunt equi*), we have I, "Some quadrupeds are not-horses" (*sunt non-equi*), which could be converted, without violating the dictum, into "Some not-horses are quadrupeds." See *Atwater*, pp. 113–117.

39. Explain and illustrate what is meant by Immediate Inference by Privative Concepts.

"Positive" concepts, as we have already seen (Topic 20), imply corresponding "privatives." Every judgment concerning positive concepts, consequently, implies judgments respecting their corresponding privatives. "Immediate Inference by Privative Concepts" consists in drawing out and stating these implied judgments. For instance, the judgment "All men are *mortal*" (positive) implies the judgment that "No men are *immortal*" (privative).

Great care is necessary in drawing these inferences—especially not to distribute a term in the inferred privative which was not distributed in the positive from which

the inference was drawn. For example: from the judgment "*Some* men are not mortal," it would not be logically correct to infer that "*No* men are immortal."

Thomson commits this blunder in the second privative assigned to his first positive on page 186 of his *Laws of Thought*.

These inferences are useful not only because we frequently throw a judgment into one of these inferential forms before determining upon its reception or rejection (see *Thomson*, p. 187), but because it is frequently easier to maintain a negative than a positive proposition. It is to be noticed that two privatives, instead of one, may be introduced into the inferred judgment; and that "Immediate Inference by Privative Concepts" is frequently complicated by "Conversion." Thus, from "All men are mortal" we infer that "Any *immortal* beings are *not-men*." See Thomson, who emphasizes the importance of this subject, § 86.

40. Explain and illustrate what is meant by Immediate Inference by Added Determinants—by Composition of Judgments.

"Immediate Inference by Added Determinants" depends upon the principle that "if equals be added to equals, their sums will be equal." E. g.:

$$\begin{array}{r} a = b \\ c = c \\ \hline \therefore\ ac = bc\ ; \end{array}$$

or, in terms (see *Thomson*, § 87), "A negro is a fellow-creature"; therefore, "A suffering negro is a suffering fellow-creature." Here, the subject and the predicate of a judgment have simply been made more "determinate," by the addition to each of the same mark. The

mark added must not be incompatible with the objects to which it is added. For example, "A *sky-blue* negro is a *sky-blue* fellow-creature" would be sheer nonsense; yet here we have added equals to equals.

By a still further application of the principle already stated and illustrated, we may have what might well be called *Immediate Inference by Composition of Judgments*, for which the formula would be:

$$\begin{array}{r} a = b \\ c = d \\ \hline \therefore\ ac = bd\ ; \end{array}$$

or, in terms, "Honesty deserves reward," and "A negro is a fellow-creature"; therefore, "An honest negro is a fellow-creature deserving reward." Care must here, also, be taken that the judgments compounded are not incompatible with each other.

41. Explain and illustrate what is meant by Immediate Inference from the Summation of Predicates.

On the principle just explained and illustrated, we may also add together several judgments which have the same subject but different predicates. It is by thus combining several judgments A that we get a definition, or a judgment U; since, though a given object may share any one attribute with many other objects, each attribute ascribed to it eliminates some of those objects, until, by the summation of a sufficient number of predicates, we get a result which is *proprius* to the object under discussion, and may serve as a definition.

"The definition of copper, for example, that it is 'a metal—of a red color—and disagreeable smell—and taste—all the preparations of which are poisonous—which is highly malleable—ductile—and tenacious—with a specific gravity of about 8·39,' is the result of as many different

prior judgments as there are properties assigned." *Thomson*, p. 191.

Other bodies may share each of these properties with copper, but no other body possesses them in combination.

42. Explain and illustrate the Immediate Inferences which are possible from a Disjunctive Judgment.

Thomson, § 90, gives two formulas to illustrate this kind of Immediate Inference:

(1) All A is x, y, or z. Therefore (on the principle that the dividing members must mutually exclude each other), the x of A is not the y or z of A.

(2) All A is x, y, or z. Therefore (on the principle that the dividing members must completely exhaust the *divisum*), the not-x of A is the y or z of A.

For an illustration in terms: "All teeth are either incisors, canine, bicuspid, or molar." Formula 1: "A canine tooth is not a molar tooth"; Formula 2: "A tooth not canine must be incisor, bicuspid, or molar."

Great care is necessary, with reference to this important class of immediate inferences, that all the dividing members be enumerated, and that they absolutely exclude each other. "Imperfect Disjunction" is one of the most fruitful sources of fallacious reasoning.

43. Explain and illustrate what is meant by Immediate Inference from Interpretation.

It has already been seen that every judgment may be read, or interpreted, in the three wholes of Extension, Intension, and Denomination. These different readings afford, according to some, so many "inferences from interpretation." The term may better be applied, however (see *Thomson*, § 89), where we infer, from such a judg-

ment as "A is B," that such a thing as B actually exists. This form of immediate inference is, unquestionably, of practical value. To illustrate by an actual example of its use: "You can not doubt that Howard was a true philanthropist." "Oh! no, I concede that." "Then you must concede that such a thing as philanthropy really exists."

44. Illustrate the importance of Immediate Inference, by showing how much is involved in the judgment "All men are mortal."

The Importance of Immediate Inference is so generally underrated, that we introduce the illustration suggested, but not very clearly stated, by *Thomson*, § 92. The judgment, "All men are mortal" means:

Read in Extension, Man is one species in the class of mortal beings.

Read in Intension, The attribute of mortality should always accompany our notion of man.

Read in Denomination, The word "mortal" may always be applied to man.

By Subaltern Opposition, Any given man is a mortal.

By Contradictory Opposition, It is false that "Some men are not mortals."

By Contrary Opposition, It is false that "No men are mortals."

By Inconsistent Opposition, It is not true that men are all the mortal beings.

By Aristotelian Conversion, It is true that some mortals are men. See p. 70, fine print.

By Hamiltonian Conversion, It is true that some mortals are all men.

By Privative Concepts, No men are immortal.

" " " Any immortal beings are not men.

By Interpretation, There is such a thing as mortality.

By Added Determinants, A man with immortal hopes, is a mortal with immortal hopes;

He who honors a man honors a mortal.

By Composition of Judgments, Since heaven is immortality, a man expecting heaven is a mortal expecting immortality.

45. Define the Syllogism, and explain how it originates, and what its essential parts are.

The syllogism (*σύν-λογίζειν*) may be defined as the formal statement of the process by which we derive one judgment from another through the medium of a third.

In discussing the syllogism, it is best to view it with reference to its origin and development, which may be traced as follows:

(1) A question arises which of two contradictory predicates is to be affirmed of a given subject. E. g.: "Is this disease fatal or not-fatal?"—"Is X Y or not-Y?" Of course, it must, on the principle of "excluded middle," be one or the other.

(2) This question leads to the affirmation of some general principle by means of which we hope to arrive at a solution of our problem. E. g.: "All consumptions are fatal"—"All Z is Y."

(3) The next step is to apply the general principle, if possible, to the case in hand. On examination, we are enabled to affirm, for example, "This disease is a consumption"—"X is Z."

(4) Then, what was at first proposed as an alternative predicate follows as a conclusion. E. g.: "Therefore this disease is fatal"—"X is Y."

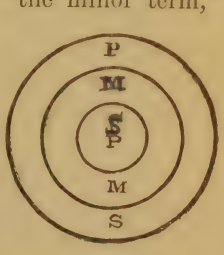
45 : *a*. What is meant by "subject" and "predicate," "middle," "major," and "minor" terms; and what objection may be made to the latter nomenclature?

It will be seen that, in every syllogism, three terms are introduced. Of these, the one which appears as subject of the conclusion (and which was also the subject of the problematic statement originally proposed for solution) is called, throughout the syllogism, the *subject*, and designated by the letter S. The predicate of the conclusion (which was the alternative predicate in the original problem) is called, wherever it may stand in the syllogism, the *predicate*, and designated by P. The term with which both the subject and predicate are compared is called the *middle term*, and designated by M.

To illustrate, we may express the syllogism just given in symbols as follows :

All consumptions are fatal.....MP ;
This disease is a consumption...SM ;
Therefore, this disease is fatal...SP.

The *subject* was formerly called "the minor term," and the *predicate* "the major term" ; because, reasoning—as the Aristotelians did—in the whole of Extension, the predicate was *major* (greater) ; the subject *minor* (less) than the middle term. E. g. : **M** is included in **P; S** is included in **M; ∴ S** is included in **P.**



If, however, we argue in the whole of Intension, we get an equally valid conclusion ; yet the expressions *major* and *minor* term should change places. E. g. : M comprehends P ; S comprehends M ; ∴ S comprehends P.

If we recognize the validity of substitutive judgments, and understand the copula to mean "is equivalent

to," we get an equally valid conclusion; yet the distinction of the subject and predicate terms, so far as magnitude is concerned, vanishes altogether. E. g.:

On this subject, Thomson (p. 194) makes some remarks which do not, to my mind, show the absurdity of the old nomenclature so decidedly as he thinks. His objection overlooks the fact that Pure Logic has to do with "formal," not "material" Extension. For instance: in the judgment "Some brave men are prudent," it is not necessary to determine how many men are covered by the terms "brave" and "prudent"; but merely whether the latter class, taken as a whole, includes any of the former. I agree with Thomson, however, in wishing the old nomenclature banished; and wish, further, that the new nomenclature did not involve the absurdity of calling a term "the subject" when it is really a predicate; and "the predicate," when it is really a subject. E. g.:

Third Figure. { MP, MS, SP. *Second Figure.* { PM, SM, SP.

45 : *b*. What are the premisses? Do they always precede the conclusion in expression — in thought?

By the "premisses" (*pre* and *mittere*) we mean the two judgments from which the conclusion is derived, and which, in the formal statement of the syllogism, ordinarily precede the conclusion. They do not, however, *necessarily* precede the conclusion either in expression or in thought. Frequently, we state our conclusion first, and then give the reasons by which we support it. Not infrequently, we form our conclusion upon vague and gen-

eral considerations, and subsequently devise arguments in its defense. See *Thomson*, § 94.

45 : *c*. What is meant by the "major" and the "minor" premiss? What objection to this nomenclature? What does Hamilton propose to substitute?

The general principle referred to in our analysis of the syllogism is commonly called "the major premiss"; the reference of the case in question to the general principle is commonly called "the minor premiss"; since in the first, the "major," and in the second, the "minor" term is compared with the middle term. But, if we reject the names "major" and "minor" *term*, we ought not to retain the names "major" and "minor" *premiss*. Further, the "premisses" are, as we have seen, not always, either in expression or thought, sent before the conclusion. In view of these facts, Hamilton proposes to call the affirmation of the general principle (or "the major premiss") the *sumption;* and the reference of the particular case to the general principle (or "the minor premiss") the *subsumption*. The change which he proposes is desirable; but the old nomenclature has so thoroughly passed into literature that it is hardly possible to supplant it.

45 : *d*. What does Thomson propose to substitute for "major" and "minor" premiss? and what objection is there to his nomenclature?

Thomson proposes to call "the major premiss," the *first* premiss; and the "minor premiss," the *second* premiss. *Predicate-premiss* and *subject-premiss* would introduce greater harmony into his nomenclature; and would be preferable from the fact that, in an analytic syllogism (or one in which the conclusion is given first, while the premisses follow as reasons for its adoption),

his "second premiss" would stand *first*, and his "first premiss" *second*. See *Thomson*, p. 200.

Unless we accept the decided innovation which Hamilton proposes, we had better continue to say "major premiss" and "minor premiss." There is, indeed, a sort of fitness in this nomenclature, since the major premiss is broader and more general than the minor.

46. Enumerate and explain the commonly accepted rules for the conduct of the Syllogism.

(1) There must, in a syllogism, be three terms, and only three.

(2) There must, in a syllogism, be three judgments, and only three.

We are endeavoring to determine the agreement or non-agreement of a subject and predicate, by comparing them with an intermediate term. Hence three terms only, and three judgments only—one to compare the predicate with the middle term, one to compare the subject with the middle term, one to express the result of this two-fold comparison.

(3) There must be at least one affirmative premiss.

(*a*) If neither premiss is affirmative, we have no conclusion. If M has nothing to do with P, and S has nothing to do with M, we have, manifestly, no ground for a conclusion, either affirmative or negative, respecting the relation of S to P.

(*b*) If both premisses are affirmative, we have an affirmative conclusion. There is, clearly, no reason why we should not.

(*c*) If either one of the premisses is negative, we have a negative conclusion. Whether we refuse to posit the general principle (i. e., negative the major premiss), or refuse to refer the particular case to the general principle (i. e., negative the minor premiss), we have equally a

negative conclusion. Either of the following syllogisms, for example, is equally valid and conclusive :

Major Premiss denied.

No M is P ;
All S is M ;
∴ No S is P.

Minor Premiss denied.

All P is M ;
No S is M ;
∴ No S is P.

Reasoning according to Aristotle, a negative minor premiss is impossible in the first and third figures—terms which will be immediately explained—for reasons that will hereafter be given (Topic 50). In the second figure (PM, SM, SP), a valid negative conclusion follows—strictly according to Aristotle—from either a universal or particular negative minor premiss. E. g. :

2. Fig. Mood, *Camestres.* } All men are rational ; No frogs are rational ; ∴ No frogs are men.

2. Fig. Mood, *Baroko.* } All horned cattle are ruminants; Some beasts are not ruminants ; ∴ Some beasts are not horned cattle.

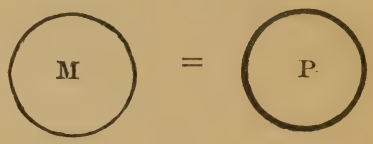
(4) The "worst relation" established between the middle term and either of the other terms, in the premisses, must be expressed in the conclusion. See *Thomson*, p. 195.

The word "relation" is used here in the technical sense already indicated. See Topic 26 ; and cf. *Thomson*, § 68. The best relation possible between two terms is

that of complete equivalence, "All is all"; the next best relation is, "All is some"; the worst is, "Some is some."

With these explanations, the following syllogism and diagram will illustrate the application of the rule just given:

All M = all P;



All S = *some* M;

∴ All S = not *all* P, but *some* P.

(5) Both the subject and the predicate must be compared with the same middle term.

(*a*) This is ordinarily secured by "distributing" the middle term in one of the premisses (as in the syllogism just given); for, manifestly, if either of the terms of the conclusion be compared with the *whole* of the middle term, and the other term of the conclusion be compared with *any part* of the middle term, the two terms of the conclusion will be compared with the same thing.

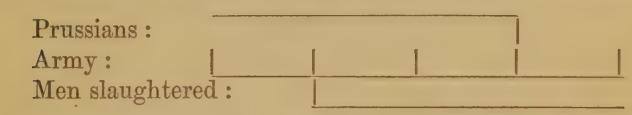
If the whole of the middle term be not introduced into one of the premisses, then one of the following conditions must be fulfilled.

(*b*) The part of the middle term with which the two other terms are compared must be distinctly specified to be the same. E. g.:

Some M is P ;
S is the *same* some M ;
∴ S is P.

(*c*) In the two premisses combined, the middle term must be distributed and something more ; that is, more than the whole of the middle term must be clearly introduced. This method of securing a comparison of the subject and predicate with the middle term is illustrated by *Thomson* (p. 198) in the following syllogism and diagram :

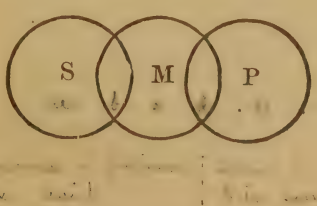
Three fourths of the army were Prussians ;
Three fourths of the army were slaughtered ;
Therefore, some who were slaughtered were Prussians.



Hamilton (*Logic*, p. 586 sq.) claims that the case (*c*), which *in this form* is certainly exceptional and foreign to pure Logic, really covers all cases. In (*a*), beyond all question, we introduce, in the two premisses combined, the middle term and something more ; and (*b*)—like (*c*) in the form just given—is clearly foreign to pure Logic.

A violation of the rule that we have just been discussing involves the fallacy of "undistributed middle." E. g. :

Some M is P ;
S is some M ;
∴ Nothing, for there is no certainty that S and P are compared with the same part of M. The following diagram illustrates this fallacy :



(6) Neither term of the conclusion must be distributed, unless it is distributed in the premisses. The violation of this principle is called "illicit process." E. g. :

All consumptions are [*some*] fatal ;
This disease is not a consumption ;
∴ It is not [*any*] fatal.

47. What is meant by the Figure of a Syllogism? and what "figures" have been recognized by logicians?

By the "figure" of a syllogism we mean the position of the middle term, with reference to the subject and predicate terms, in the premisses. See *Thomson*, § 95.

Four arrangements of the terms in the premisses of a syllogism are possible ; and four "figures" have, consequently, been recognized by logicians :

1.	2.	3.	4.
M P,	P M,	M P,	P M,
S M,	S M,	M S,	M S,
S P.	S P.	S P.	S P.

47 : *a*. Which of the figures affords the most natural arrangement of terms?

It has been claimed (and, I think, with justice) that the first figure is more natural than either of the others ; because, in that figure, the terms which appear as subject and predicate in the conclusion stand as subject and predicate in the premisses.

Thomson, however, claims that (since the more extended of two terms naturally stands as the predicate of a proposition), if we recognize the middle term as more extended than the other two, the second figure, in which the middle term is the predicate of both premisses, is more natural than the first ; while, if the middle term is obviously less extended than the other two, the third figure—in which it stands twice as subject—is most natural. See *Laws of Thought*, pp. 201–205. It is to be remarked, however, that to determine the comparative

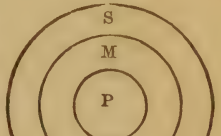
extent of the terms introduced in a syllogism would take us beyond the sphere of Pure Logic.

The third figure is certainly more natural than either of the others for inductive reasoning; since the inductive syllogism falls regularly into the following form:

X, Y, Z are ruminants—MP;
X, Y, Z are all horned cattle—MS;
∴ All horned cattle are ruminants—SP.

47 : *b*. What objections have been urged to the fourth figure?

The unnaturalness of the fourth figure—in that the terms which appear in the conclusion as subject and predicate have neither of them appeared in the premisses in that capacity—is obvious. It is further urged against the fourth figure that it is "a mere perversion of the first figure, in which the proper conclusion does not appear, but the converse of it gained by Immediate Inference." See *Thomson*, p. 207. Hamilton's objection (*Logic*, p. 302 sq.) is even more weighty. He characterizes the fourth figure as "A monster, undeserving of toleration —a *hybrid*, unnatural, useless, and logically invalid; the premisses being in the whole of Extension, and the conclusion in the whole of Intension. P is included in M; M is included in S; therefore, S is included in P? No, for S is the greatest whole, and P the smallest part; but S comprehends P."



It is noteworthy that the fourth figure was not recognized by the early disciples of Aristotle, but is a comparatively recent addition to logical science.

47 : *c*. What importance is now attached to Logical Figure? and how is it possible to do away with Figure altogether?

Great attention was paid to Logical Figure by the Aristotelian logicians down to and including Whately;

because, accepting the Aristotelian dictum with reference to the distribution of the predicate, the question whether a term appeared in the premisses as subject or predicate was a matter of prime importance, and might affect the whole process of reasoning. If, with most modern logicians, we reject the Aristotelian dictum, and accept Hamilton's explicit quantification of the predicate, the significance and value of Logical Figure utterly disappears; and the Science of Thought is thus conformed to the thinking processes of the unlettered masses; who, if they can only establish a tangible connection between two terms, never stop to inquire which term is subject and which is predicate.

Not only is Logical Figure, by recent modifications of Logic, rendered insignificant; but Logical Figure may, by "the unfigured syllogism"—suggested by Sir William Hamilton—be done away with altogether. For example, in the syllogism,

Copperas and sulphate of iron are identical;
Sulphate of iron and sulphate of copper are not identical;
∴ Copperas and sulphate of copper are not identical,

we get a perfectly valid conclusion, though Logical Figure has entirely disappeared. See *Hamilton*, p. 587; *Thomson*, § 98; *Atwater*, pp. 142–143; *The Port Royal Logic*, chap. 10; and Jevons, *Principles of Science*.

In further illustration of the point just made, the material embodied in Hamilton's "unfigured syllogism" may be thrown into this form:

No S of I is any S of C . . . . . MP;
All C is some [better *all*] S of I . . . SM;
∴ No C is any S of C . . . . . SP.

Here we have a perfectly valid syllogism in the first figure, mood EAE.

Or we may throw the material into this form:

No S of C is any S of I . . . . . PM;
All C is some [better *all*] S of I . . . SM;
∴ No C is any S of C . . . . . SP.

Here we have a perfectly valid syllogism in the second figure, mood EAE.

But if we throw the material into this form (the third figure):

No S of I is any S of C . . . . . MP;
All S of I is some [Aristotelian] C . . . MS;

the conclusion,

No C is any S of C . . . . . SP,

involves illicit process. We distribute the term C in the conclusion when it was not (and, according to the Aristotelian dictum, could not be) distributed in the premisses. Hamilton, by reading the minor premiss "All S of I is all C" (in defiance of the dictum), would get an equally valid conclusion in the third figure. Or, by throwing his material into the form in which it first appears, he can do away with figure altogether. When we say:

C and S of I are identical;
S of I and S of C are not identical,

we express the same ideas as in the premisses given above, and get an equally valid conclusion; but C and S of C do not stand in any relation of subject or predicate to S of I. Hamilton throws his premisses into this form, not because he would advocate the employment of such modes of expression, but to illustrate the insignificance of Logical Figure, which utterly disappears when such forms are employed.

48. How have the Fundamental Laws of Thought been stated in their application to syllogistic reading?

The Aristotelian stated these laws in the "*dictum de omni et nullo*," namely: "*Quicquid de omni valet, valet etiam de quibusdam et singulis.*" For other statements of this dictum, see *Thomson*, § 95 and notes.

This dictum is applicable only to syllogisms in the first figure, to which the Aristotelian reduced syllogisms

in either of the other figures before testing them by the laws of the syllogism. Separate *dicta* have, however, been supplied for each of the other figures (for which, see *Thomson, ut supra*) ; but, with the neglect of "figure," these *dicta* have fallen into comparative insignificance. Hamilton (*Logic*, p. 559 sq.) gives an exhaustive discussion of the entire subject.

49. What is meant by the Mood of a syllogism?

The "Mood" of a syllogism expresses the character —with reference to Quantity, Quality, and Relation—of the three judgments which compose it. Thus, we have the mood AAA, indicating a syllogism made up of three judgments, each of which is universal, affirmative, and attributive. See *Thomson*, § 99. The syllogism that we gave in our primary analysis of "mediate inference" (Topic 45) is an example of the mood AAA.

"Logical Mood" was formerly, like "Logical Figure" (and for similar reasons), regarded as of prime importance. It has (for similar reasons) fallen into comparative neglect.

49 : *a*. How many moods are possible, and how many valid, according to Aristotle—Hamilton—Thomson?

The possible moods will be all the conceivable combinations, in groups of three, of the judgments recognized. That is :

According to *Aristotle*, $4 \times 4 \times 4 = 64$ possible ; 10 valid.
" *Hamilton*, $8 \times 8 \times 8 = 512$ " 108 "
" *Thomson*, $6 \times 6 \times 6 = 216$ " 62 "

For a table of the valid moods (recognizing U and Y), see Thomson, *Laws of Thought*, p. 210.

49 : *b*. Why are not all the possible moods valid?

Because many of them violate the rules for the conduct of the syllogism. Thus EEE would draw a conclu-

sion from two negative premisses; AAE, a negative conclusion from two affirmative premisses; EAA, an affirmative conclusion from a negative major premiss; AIA does not follow the "worst relation"; AEO involves "illicit process" [All M is some P; No S is any M; Some S is no P]; III involves "undistributed middle," etc., etc.

50. Give and explain the mnemonic lines which indicate the valid moods in the four figures, with the method of converting the other figures to the first.

The mnemonic lines (which were of prime importance to the Aristotelian logician) are:

BArbArA, CElArEnt, DArII, FErIOque, *prioris;*
CEsArE, CAmEstrEs, FEstInO, BArOkO (or FAkOrO), *secundæ;*
Tertia DArAptI, DIsAmIs, DAtIsI, FElAptOn, BOkArdO (or DOkAmO), FErIsO *habet;*
Quarta insuper addit: BrAmAntIp, CAmEnEs, DImArIs, FEsApO, FrEsIsOn.

These lines are designed to indicate the valid moods in each figure, and embody rules for the reduction of syllogisms in the second, third, and fourth figures to the first figure, in order that they may be tested by the *dictum de omni et nullo.* Since the introduction of separate *dicta* for the second and third figures, the mnemonic lines have lost their practical value.

The following points may, however, be noted as matter of logical history:

The vowels which enter into the words in the first line indicate the valid moods in the first figure, etc., etc.

The consonants with which the words in the last three lines begin indicate the mood of the first figure, to which the moods of the second, third, and fourth figures are to be reduced. For instance: Cesare, Camestres, and Camenes are to be reduced to Celarent, which begins with the same consonant.

S, following a vowel, indicates that the judgment which that vowel denotes is to be converted *simply* for purposes of reduction; p, that it is to be converted *per accidens;* k, that it is to be converted by *contraposition.*

M (*mutanda*) indicates that, in reduction, the premisses are to be transposed. The other letters are of no especial significance, being used only to make up words.

Take, for illustration, the following syllogism given in the third figure, mood Darapti :

All Z is Y.....MP ;
All Z is X.....MS ;
∴ Some X is Y....S P.

This syllogism must be reduced to Darii in the first figure. All that is necessary is to convert the minor premiss *per accidens*, and we have :

All Z is Y.....MP ;
Some X is Z....SM ;
Some X is Y....S P.

For further illustrations of this reduction, see Schuyler, *Logic*, p. 73.

It should be observed that not all the moods which are valid according to the Aristotelian dictum, are valid in every figure. Thus, in the first figure, (a) the minor premiss must be always affirmative and (b) the major premiss always universal. (a) If the major premiss be negative, the minor premiss must be affirmative, because from two negative premisses you get no conclusion. If the major premiss be affirmative, the major term, standing in the predicate, must be particular ; and to have a negative minor premiss would give a negative conclusion, distributing the major term and involving "illicit process." Hence, the minor premiss must in the first figure be affirmative. (b) But an affirmative minor premiss can not distribute the middle term. Hence, to distribute the middle term, the major premiss must be universal.

Again, the second figure can yield only negative conclusions ; because the middle term, being a predicate in both premisses, requires a negative premiss (which involves, of course, a negative conclusion) to distribute it.

Again, the third figure yields only particular conclusions. In this figure, both the major and the minor terms, standing as predicates in the premisses, can only be distributed by negation. If both premisses be negative, we have, of course, no conclusion. If the minor premiss be negative (to secure a universal conclusion by

distributing the minor or subject term), we shall have "illicit process"; for the negative conclusion involved by a negative minor premiss would distribute the major, or predicate, term, which was undistributed in the premisses. It being thus impossible, in this figure, to distribute the subject term, we must have a particular conclusion.

It will be seen that the restrictions upon these figures are founded wholly upon the Aristotelian dictum with reference to the distribution of the predicate—with the rejection of which dictum the restrictions vanish, and "figure" itself becomes so insignificant as hardly to deserve mention.

The mnemonic lines are given, partly as a curious bit of logical history, and partly to illustrate the value of Sir William Hamilton's contributions to logical science.

51. Explain the nature of the Conditional Syllogism, and classify syllogisms of this nature.

In the Conditional Syllogism, the major premiss at least—sometimes, also, the minor premiss—is a conditional judgment. Conditional syllogisms are classified, according to the nature of the major premiss (See Topic 28 : *a*), as Hypothetical, Disjunctive, and Hypothetico-Disjunctive.

51 : *a*. State and illustrate the laws which govern the Hypothetical Syllogism.

The Hypothetical Syllogism is founded on the principle of "reason and consequent" (see Topic 10), and governed by the following laws :

(1) If the antecedent be affirmed in the minor premiss, the consequent must be affirmed in the conclusion. E. g. :

If A is B, C is D.
A *is* B ;
∴ C is D.

(2) If the consequent be denied, the antecedent must be denied. E. g. :

If A is B, C is D.
C is *not* D ;
∴ A is not B.

(3) If the antecedent be denied, no conclusion follows ; for the consequent may be true on other grounds. E. g. :

If A. B. C. be a corrupt man, he is unfit for office ;
He is not a corrupt man ;
∴ Nothing—for A. B. C. may not know how to read or write.

To draw a conclusion here would involve "illicit process." We should infer from A. B. C.'s not being *some* unfit for office that he is not *any* unfit for office. E. g. :

All corrupt men are [some] unfit for office ;
A. B. C. is not a corrupt man ;
∴ He is not [any] unfit for office.

This fallacy is very common, and very deceptive. We need to remember that to deny the antecedent of a hypothetical yields no valid conclusion, *unless the relation between the antecedent and the consequent is uniform and invariable ;* as, for instance, in the judgment, "If the thermometer indicates less than 32°, ice is formed." See *Thomson*, pp. 227–230 ; Fleming, *Vocab. of Phil.*, p. 78. Jevons 131.

(4) If the consequent be affirmed, no conclusion follows ; for the consequent may be affirmed on other grounds than those laid down in the antecedent. E. g. :

If a community is intelligent, it will establish schools ;
This community establishes schools ;
∴ Nothing—for it may establish schools under compulsion, or from a spirit of rivalry.

To infer the intelligence of the community from the fact that it establishes schools, would involve the fallacy of "undistributed middle" (see Topic 46). E. g. :

All intelligent people are *some* people establishing schools ;
These people are *some* people establishing schools ;
∴ Nothing.

Here, as in the previous case, no inference is possible unless antecedent and consequent are inseparably connected ; yet many editors are no wiser than a little boy of my acquaintance, who, having heard it maintained that there would be a panic if Greeley were elected, inferred, from the financial stringency which followed the presidential campaign, the election of Greeley.

The illustration just given suggests the necessity of scrutinizing the major premiss in syllogisms of this nature with especial care, since it frequently embodies matter of opinion rather than matter of fact.

51 : *b*. Explain and illustrate the Disjunctive Syllogism.

Attention has already been called (see Topic 42) to the "immediate" inferences which are possible from a disjunctive judgment. The disjunctive judgment also yields some simple "mediate" inferences which ought to be, at least, enumerated.

If either term of a disjunctive judgment be affirmed of some new term, the other term of the disjunctive judgment may be affirmed of the new term. E. g. :

A is either x, y, or z ;
B is A ;
∴ B is either x, y, or z.

B is either x, y, or z ;
∴ B is A.

B is x [or B is y, or B is z] ;
∴ B is A.

If either term of the disjunctive judgment be denied,

as a whole, of a new term, the other term of the disjunctive judgment may be denied, as a whole, of that new term. E. g. :

B is not A ;
∴ B is neither x, y, nor z.

B is neither x, y, nor z ;
∴ B is not A.

But nothing follows from denying the predicate of a disjunctive judgment, in part, of a new term. E. g. :

A is either x, y, or z ;
B is not x ;
∴ Nothing—it may be either y or z.

The principles on which these mediate influences rest have already been sufficiently explained (see Topics 21 and 42).

51 : *c.* Classify and illustrate the Hypothetico-Disjunctive Syllogism.

Of the Hypothetico-Disjunctive Syllogism there are three forms, which are classified according to the character of the major premiss. Thus we may have, in the major premiss :

(1) A common antecedent and a plurality of consequents—If A is B, either C is D or E is F.

(2) A plurality of antecedents and a common consequent—If A is B or C is D, then E is F.

(3) A plurality of antecedents and a plurality of consequents—If A is B, C is D ; and if E is F, G is H.

All the forms of the Hypothetico-Disjunctive Syllogism are governed by substantially the same rules as the Hypothetical Syllogism ; though those rules are complicated by the fact that in some cases the antecedent, in others the consequent, may be affirmed or denied in *part* rather than as a whole.

The following examples in terms will probably serve,

better than any formal statement, to explain the application of these rules :

Class 1 (common antecedent and plurality of consequents) :

If A. B. is a demagogue, he will either rule or ruin.

He is a demagogue (*antecedent affirmed*) ;

∴ He will either rule or ruin.

He will neither rule nor ruin (*consequent denied wholly*) ;

∴ He is not a demagogue.

He will either not rule or not ruin (*consequent denied disjunctively*) ;

∴ Nothing—for if he does either, he may, or may not, be a demagogue.

He will either rule or ruin (*consequent affirmed*) ;

∴ Nothing—for a madman or a fool might do that.

He is not a demagogue (*antecedent denied*) ;

∴ Nothing—for the same reason.

Class 2 (plurality of antecedents and single consequent) :

If it has rained, or if a dew has fallen, the ground is wet ;

It has rained, or a dew has fallen (*antecedent affirmed in toto*) ;

∴ The ground is wet.

It has rained (*antecedent affirmed partitively*) ;

∴ The ground is wet.

A dew has fallen (*antecedent affirmed partitively*) ;

∴ The ground is wet.

The ground is not wet (*consequent denied*) ;

∴ It has neither rained nor has a dew fallen.

The ground is wet (*consequent affirmed*) ;

∴ Nothing—it may have been wetted by a street sprinkler.

It has neither rained nor has the dew fallen (*antecedent denied in toto*) ;

∴ Nothing—unless you are certain that the antecedent includes all possible conditions precedent to the consequent.

It has not rained (*antecedent denied in part*);
∴ Nothing—the dew may have fallen.

The dew has not fallen (*antecedent denied in part*);
∴ Nothing—it may have rained.

Class 3 (a plurality of antecedents and plurality of consequents):

If this man was aware of the nature of his deeds, he is a murderer; if he was not aware, he is insane.

But he either was or was not aware;
∴ He is either a murderer or insane.

51 : *d*. Explain and illustrate Whately's idea of the dilemma.

The "dilemma," according to Whately (see Topic 28 : *a*), is a syllogism whose major premiss is a hypothetico-disjunctive judgment, with a plurality of antecedents and a single consequent; while its minor premiss is a disjunctive judgment. E. g.:

If A is B, or C is D, E is F;
But either A is B or C is D;
∴ In any case, E is F.

If this man is either a murderer or insane, he ought to be shut up;
But he *is* either a murderer or insane;
∴ In any case, he ought to be "restrained of his personal liberty."

The practical utility of this form of reasoning—which is governed by rules already stated and exemplified—is frequently illustrated in our courts of justice.

52. Explain the nature of the Incomplete Syllogism, and give the classification under this head.

The full and regular forms of the syllogism are much less frequently used than certain incomplete forms, which the reader or hearer is supposed to be capable of filling up for himself—the regular syllogism being employed as a standard to which all processes of reasoning may be re-

duced, and by which they may be tested. Under the head of Incomplete Syllogisms we recognize four principal forms: Enthymeme, Sorites, Prosyllogism, and Episyllogism.

52 : *a*. Define and illustrate Enthymeme, Sorites, Prosyllogism, and Episyllogism.

An "enthymeme" is a syllogism of which one premiss is unexpressed, or held *ἐν θυμῷ*. E. g. : "The freedmen are unfit to vote because they can not read"—a full statement of which argument would be :

Whoever can not read is unfit to vote :
The freedmen can not read :
∴ They are unfit to vote.

The suppressed premiss is generally—as in the case before us—the major premiss.

A "sorites" (*σωρός*, a heap), is a chain-syllogism (Ger. *Kettenschluss*), combining several syllogisms, in the first figure, in such a way that the predicate of one premiss becomes the subject of the next, until, in the conclusion, the predicate of the last premiss is affirmed of the subject of the first. The following diagram will illustrate these statements.

A is in B ;
B is in C ;
C is in D ;
D is in E ;
∴ A is in E.

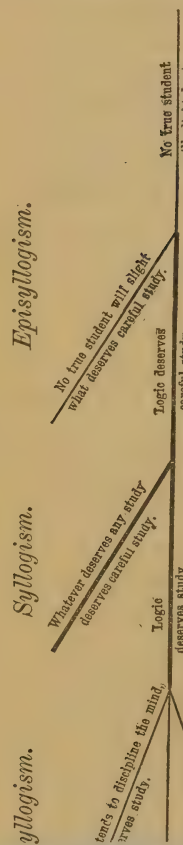
All the premisses save the first are "major." The suppressed conclusion of the first syllogism introduced in a "sorites" becomes the suppressed minor premiss of the second syllogism; and so on. Thus the "sorites" before us, analyzed into its component syllogisms, would be:

A is in B;
B is in C;
[∴ A is in C.]

C is in D;
[A is in C;]
[∴ A is in D.]

D is in E;
[A is in D;]
∴ A is in E.

The "prosyllogism" is a syllogism whose conclusion becomes a premiss in another syllogism which immediately follows it. The "episyllogism" is a syllogism which takes the conclusion of a syllogism that immediately precedes it for one of its premisses. The prosyllogism is ordinarily introduced to support a doubtful premiss; the episyllogism, to carry a conclusion more pointed and satisfactory



—A manufacturer of cod-liver oil thus defies competition: "The codfish in the open sea are pursued by whales, sharks, etc., and live in continual terror; hence, like all animals under the same conditions, have liver diseases, jaundice and the rest. I avoid the mistake of ordinary manufacturers by obtaining my fish where no marine monster can gain access. They live peaceably and die healthy. This is why my oil is the best."

Under the law of Providence; life is a probation; probation is a succession of temptations; temptations are emergencies; and for emergencies we need the preparation and the safeguard of prayer.—[Austin Phelps.

) illustrate both by one ex-
any study, deserves careful
n syllogism]; Logic deserves
in syllogism], *since it tends*

to discipline the mind [prosyllogism] ; Therefore, Logic deserves careful study [conclusion of main syllogism], *and no true student will neglect it* [episyllogism].

In this example, the prosyllogism and episyllogism appear as enthymemes, being indicated by the italicized words. The accompanying diagram gives them expanded so as more clearly to illustrate their relation to the main syllogism.

53. What two-fold division is recognized under the head of Applied Logic?

Applied Logic—which considers the Laws of Thought in their application to the discovery of truth—may be devided into two branches. The first, which is concerned with the exposure of incorrect processes of reasoning, treats of FALLACIES. The second, which teaches how to make correct practical application of the Laws of Thought, is called METHOD.

53 : *a*. Define a Fallacy, a Sophism, a Paralogism.

A "fallacy" is a form of reasoning which, though specious and delusive, is nevertheless radically defective. A fallacious argument which is used with the intention of deceiving others, is called a "sophism" ; a fallacious argument by which he who uses it is himself deceived, is called a "paralogism." The distinction is moral, not logical. The same argument may be to one man a "sophism," to another man a "paralogism."

53 : *b*. Define Method.

The *Port Royal Logic* says : "Method may be called, in general, the art of disposing of a series of many thoughts, either for the discovery of truth when we are ignorant of it, or for proving it to others when it is already known.

PROVO, UTAH

Thus, there are two kinds of method: one for discovering truth, which may be called *analysis*, or the method of invention; and the other for explaining it to others, which may be called *synthesis*, or the method of teaching." Cf. Jevons, *Logic*, p. 201 sq. Hamilton defines method as "the regulated procedure toward a certain end —a process governed by rules which guide us, by the shortest way, straight toward a certain point, and guard us against devious aberrations." *Logic*, p. 336.

54. Give a general Classification of Fallacies, and explain the terms used in classification.

Fallacies may be classified as:

(1) Formal.
(2) Semi-Material.
(3) Material.

Formal fallacies are those which exist in the "form" of the thought expressed, altogether apart from its "matter." They may be detected and exposed, by simply applying the rules which govern the conduct of the syllogism. For example: If a syllogism introduce more than three terms, or draw an affirmative conclusion from premisses one of which is negative, or any conclusion from premisses both of which are negative, it is palpably incorrect in *form*, whatever the matter of thought may be.

A semi-material fallacy is a fallacy which really exists in the form of thought, but which can only be detected and exposed by reference to the matter. E. g.:

Light is contrary to darkness;
Feathers are light;
∴ Feathers are contrary to darkness.

This humorous syllogism involves a fallacy in form, since it introduces four terms; but the fact that it introduces four terms is not apparent until we notice the different

matter denoted by the word "light" in the two premisses. Under the head of "semi-material" fallacies fall all cases of "ambiguous middle"—than which no fallacy is more frequent or more deceptive.

Material fallacies are correct in form, and give us a conclusion which follows legitimately from the premisses assumed; but they are defective in matter.

54: *a.* Mention the ways in which a Material Fallacy may be involved in our reasoning.

Material Fallacies may be involved in our reasoning:

(1) By *the unwarrantable assumption of a premiss.* Thus, we may have a conclusion correctly drawn from a premiss which itself requires proof, or which, indeed, is utterly false.

(2) By *irrelevant conclusion*, or, as it has been technically termed, *ignoratio elenchi.* Here, the premisses may be unimpeachable, and the conclusion may follow legitimately from them; but it is not *ad rem*—it has no proper bearing on the question at issue.

54.: *b.* Enumerate some of the fallacies under the head of Irrelevant Conclusion.

Under the head of Irrelevant Conclusion we recognize:

(1) The *argumentum ad verecundiam*, which is employed when, instead of discussing a question on its merits, an appeal is made to our respect for constituted authorities and existing institutions—for example, when woman's claim to vote is set aside, upon the consideration that she never has voted.

(2) The *argumentum ad ignorantiam*, or assuming a point that ought to be proved, in case one's opponent or one's hearers can not disprove it.

(3) The *argumentum ad populum*, or an appeal to

the passions and prejudices of one's hearers; as when an advocate dwells on the danger of letting a criminal loose upon the community, and draws a thrilling picture of the misery he has caused, instead of proving that he *is* a criminal.

(4) The *argumentum ad hominem*, or a diversion of attention from the question at issue to the personal unfitness of one's opponent to raise such a question. E. g.: "You're a pretty fellow to accuse the Erie Road of rascality. How long is it since you went down into the southern tier of counties to defend the corporation against just such a charge?"

(5) Any argument, however respectable, that is not *ad rem*, or to the point.

54: *c.* Enumerate and explain the fallacies under the head of Unwar[illegible] Premiss.

Under the head of Unwar[illegible] Premiss, we may include the

(1) *Petitio Principii*, or is, virtually assuming, *in one* the argument is constructed row Atwater's example, "if a given tariff will be benefi[illegible] the public wealth, without [illegible] trates a *petitio principii*."

(2) *Argumentum in circulo*—in which the premisses are used to prove the conclusion; and then the conclusion, to prove the premisses. E. g.: "Why did the Saviour do this? To fulfill prophecy. Why was the prophecy given? To be fulfilled." Or, again (from a student's oration): "The weak and decrepit must ever go to the wall, because, from the inexorable condition of things, the strong and healthy must ever win."

THERE are said to be no poor houses and jails in Norway. The Republican party hasn't got into power there yet.

WHAT OUR SUNDAY-SCHOOLS NEED.

Without a full supply of good Baptist literature, no school can be a success. Therefore, every school should seek to supply themselves with the Periodicals published by the American Baptist Publication Society, in Philadelphia.

(3) *Non causa pro causa,* in which that which is merely an antecedent is assumed as a cause. E. g. : "Night invariably precedes day ; therefore, it is the cause of it"—the assumption being that the invariable antecedent is always a cause. =

On the distinction between an antecedent and a cause, see Topic 10 : *a.* Cicero says : "Causa est ea quid efficit id cujus est causa. Non sic causa intelligi debet, ut, quod cuique antecedat, id ei causa sit ; sed quod efficienter antecedat."

The stock illustration of this fallacy (which is sometimes characterized as *Post hoc ; ergo, propter hoc*) is embodied in the famous passage by Hugh Latimer concerning Tenterden Steeple and Goodwin Sands. See Reed's *Eng. Lit.,* p. 166.)

(4) *Non tale pro tali,* in which we draw our conclusion from a similarity that is assumed, without sufficient proof, to exist. E. g. : "All other religions are a delusion ; therefore the Christian religion is a delusion." Here there is a manifest assumption of the minor premiss, "The Christian religion is like all other religions" —which is the very point at issue.

(5) The *Fallacia Fictæ Universalitatis,* which is a groundless induction from an insufficient number of cases—it being unwarrantably assumed that those few cases are a fair representative of all possible cases. E. g. : "Some enterprises begun on Friday have turned out badly ; therefore Friday is an unlucky day." "I never saw such an unhealthy place as Rochester." "Why ?" "Because there has been a death in the Freshman class."

55. Enumerate and explain some of the more prominent fallacies which fall under the head of Ambiguous Middle.

The most prominent fallacies under the head of Ambiguous Middle are :

(1) *The Fallacy of Composition and Division*, in which the middle term is taken individually in one premiss, and collectively in the other. E. g. :

3 and 4 are two numbers [Division] ;
7 is 3 and 4 [Composition] ;
∴ 7 is two numbers.

7 is one number [Composition] ;
3 and 4 is 7 [Division] ;
∴ 3 and 4 are one number.

All the angles of a triangle are equal to two right angles ;
A B C is an angle of a triangle ;
∴ A B C is equal to two right angles.

The Latin language has the advantage of ours here. It would use *cuncti* (*conjuncti*), instead of *omnes*, in the major premiss, and thus utterly dodge the fallacy.

A kindred fallacy is especially common, where the word "all" is introduced in negative judgments ; since there may, obviously, be a question whether the negative modifies the copula or the adjective. To borrow an example from Whately : "If all testimony to miracles is to be admitted, the Popish legends are to be believed. But the Popish legends are not to be believed. Therefore, all testimony to miracles is not to be admitted." Here, the correct inference would be : Not all testimony to miracles is to be admitted.

Satan is the first person known to have made use of this fallacy ; for in the question, "Hath God said ye shall not eat of all the trees in the garden ?" (Heb.), he meant to insinuate that Eve was forbidden to eat of every tree, while she was forbidden to eat of only one.

(2) The *Fallacia Accidentis*, which consists in using the middle term in one premiss in a general and commonly accepted sense, in the other in a minute and special sense. E. g. : "Government [general] is a blessing ;

The most cruel despotism is a government [special]; Therefore, the most cruel despotism is a blessing."

(3) The *Fallacy of Etymology*, in which the middle term is used in one premiss in its strictly derivative, in the other in its commonly accepted sense. We may take an example from Adam Smith's *Wealth of Nations:* "Projectors [*i. e.*, men full of projects] ought not to be trusted; This man is a projector [*i. e.*, he has formed a project]; Therefore, he ought not to be trusted."

A similar fallacy consists in using a subject or a predicate, in the premisses, in a different sense from that which it bears in the conclusion. Take, for instance, Horne Tooke's argument:

"Truth [derivative sense, according to Tooke] is what one *trows*, or imagines;
What one trows, or imagines, is variable;
∴ Truth [in the commonly accepted sense] is variable."

(4) The *Fallacia Plurium Interrogantium*, which consists in adroitly blending with a question, that one might reasonably be expected to answer promptly and unequivocally, another question, of a doubtful nature, which would be covered by the answer to the main question; or a statement to which the answer to the main question would seem to give assent. E. g.: "Why did the Saviour wish his disciples to have swords in the garden of Gethsemane?" That is: *Did* he wish them to have swords; and, if so, *why?* "Did you introduce a resolution to fix a certain salary at a less rate than it has heretofore been?" Yes and no. I introduced a resolution to fix a certain salary; but cutting it down was the result of an amendment over which I had no control.

This fallacy is an especial favorite with the lawyers, and is the secret of many of their demands for "a categorical answer," when examining witnesses. Aristotle

was shrewd enough to detect it, and emphasizes the wisdom of *answering but one question at a time.*

56. Give a Tabular Analysis of Fallacies.

- FALLACIES.
  - FORMAL:
    - Four Terms.
    - Negative Premisses.
    - Undistributed Middle.
    - Worst Relation.
    - Illicit Process.
  - SEMI-MATERIAL: (*Ambiguous Middle.*)
    - Composition and Division.
    - Fallacia Accidentis.
    - Fallacia Etymologiæ — M. T. / S. or P.
    - Fallacia Plurium Interrogantium.
  - MATERIAL:
    - *Unwarrantable Assumption.*
      - Petitio Principii.
      - Arg. in Circulo.
      - Non Causa pro Causa.
      - Non Tale pro Tali.
      - Fallacia Fictæ Universalitatis.
    - *Irrelevant Conclusion.*
      - Arg. ad Verecundiam.
      - " " Ignorantiam.
      - " " Populum.
      - " " Hominem.

57. Explain the difference, in object and method, between Inductive and Deductive Reasoning.

See Jevons, p. 212 The mind, by process of *induction,* generalizes the individual phenomena which it notices, and arrives at general notions. By process of *deduction,* it unfolds the significance of these general notions, and applies the principles involved in them to particular cases. In other words: "Deduction consists in passing from more general to less general truths; Induction is the contrary process—from less to more general." (Jevons, *Principles of Science,* vol. 1, p. 14.) Thus, as the result of my ob-

servation of individual phenomena, I arrive, by *induction*, at the general notion that "all bodies, left free to fall, tend toward the earth." By *deduction* from this general notion, I arrive at the conclusion that "This pencil, if left free to fall, will tend toward the earth." Both the inductive and the deductive processes fall within the scope of Logic; but it is the deductive process which Logic has until recently especially emphasized. The tendency now is to attach equal—if not superior—importance to Inductive Logic; and this tendency is, doubtless, in the right direction. The old logicians were inclined to assume their premisses without adequate investigation, and rigidly deduce from them every conclusion that they could possibly yield. Modern logicians scrutinize their premisses most carefully. Indeed, most recent logics—e. g., those of Mill, Bain, and Fowler—devote more space to *inductive* than to *deductive* Logic.

Hamilton (*ed. of Reid's Works*, p. 712, note) says: "The Organon of Aristotle and the Organon of Bacon [the one emphasizing *deduction*, the other *induction*] stand in relation; but it is the relation of contrariety. The one considers the laws under which the subject thinks; the other, the laws under which the object is known. To compare them together is to compare excellences of different species. Each proposes a different end; both, in different ways, are useful; and both ought to be assiduously studied." On the nature and degree of our indebtedness to Bacon, with reference to *induction*, see *Atlantic Monthly*, vol. xxii., p. 573 sq.; Jevons, *Logic*, p. 255; Macaulay, *Essays*, vol. ii., p. 395.

Jevons (*Principles of Science*, vol. i., p. 139) claims that "It can not be said that the inductive process is of greater importance than the deductive process; because the latter process is absolutely essential to the existence of the former. Each is the complement and counterpart

of the other, . . . so that the question of relative importance can not arise." He regards Induction, however, as involving investigations of far higher difficulty, variety, and complexity, than those of Deduction.

57 : *a.* What are the questions of prime importance with reference to Inductive Reasoning?

(1) Have the phenomena from which we form our induction been carefully observed ?

(2) Are they accurately stated ?

(3) Has any obvious phenomenon been ignored, or distorted, in order to support a preconceived theory ?

(4) Are the observed phenomena sufficiently numerous and clear to warrant the affirmation respecting a class of what we observe in particular cases ?

(5) Precisely what general inference do the particular phenomena under our consideration substantiate ?

57 : *b.* Mention some of the criterions by which we may test the accuracy of our inductions.

The first (and theoretically the most satisfactory) test is that of simple enumeration—in which all the individual instances possible are scrutinized, and each is found to illustrate the principle that we affirm of the class. Practically, however, this test is comparatively fruitless ; since we can never be certain that we *have* examined all the individual instances, and since we are seeking to go beyond our observation and experience, and make an affirmation concerning things that we have *not* seen as the result of examining things that we *have* seen.

We endeavor, therefore, not only to identify in as many cases as possible the principle that we seek to affirm, but to distinguish, in the cases which we observe, that causative element which makes them what they are, and which must produce similar effects whenever it is suffered

to work unchecked. Thus (to borrow an example from Atwater) we determine, by simple enumeration, that the orbits of all known planets are elliptical; and hence—on the general ground of the uniformity of nature (which the disciples of John Stuart Mill seem to regard as an *a priori* truth, but which others accept as a necessary inference from their belief that the universe is governed in accordance with an intelligent plan)—are warranted in assuming that the orbits of all planets yet to be discovered will prove to be elliptical. But this presumption is immeasurably enhanced, when we are able to affirm that the elliptical orbits of the planets are the resultant of those centripetal and centrifugal forces that prevail throughout the universe.

Just here a modern development of the science of Logic forces itself upon the attention of the advanced student; though it would be impossible to discuss it at suitable length, and, indeed, it is better to omit it altogether, in an elementary treatise. We refer to what is called *the Logic of Probability*, which is discussed, very briefly and inadequately, in Thomson's *Laws of Thought*, § 122; and more fully in De Morgan's *Formal Logic*, p. 141 sq.; Jevons's *Principles of Science*, vol. i., p. 139 sq.; and Venn's *Logic of Chance*.

57 : *c*. What principles should govern us in our search for causes?

In searching for the causes that produce certain effects, we should remember:

(1) That the assumed cause, or causes, must always be present where the effect is noticed.

(2) That the effect must always follow where the assumed cause is noticed, unless we can detect the presence of some adequate counteracting agency.

(3) That, as the assumed cause varies in intensity, the effect must vary. For example: the theory that the mer-

cury was sustained in the Torricellian tube by the pressure of the atmosphere was verified by taking the tube up a high mountain and ascertaining that the effect varied with its assumed cause.

(4) That we must be able to account for residual variations (or incidental phenomena) without invalidating the assumed cause. Under this head, Thomson (*Laws of Thought*, p. 254 sq.) gives some fine illustrations, of which we reproduce one.

"In Sir Humphry Davy's experiments upon the decomposition of water by galvanism, it was found that (besides the two components of water—oxygen and hydrogen) an acid and an alkali were developed at the two opposite poles of the machine. As the theory of the analysis of water did not give reason to expect these products, they were a *residual phenomenon*, the cause of which was still to be found. Some chemists thought that electricity had the power of *producing* these substances of itself; and if their erroneous conjecture had been adopted, succeeding researches would have gone upon a false scent, considering galvanic electricity as a *producing* rather than as a *decomposing* force. The happier insight of Davy conjectured that there might be some hidden cause of this portion of the effect; the glass vessel containing the water might suffer partial decomposition, or some foreign matter might be mingled with the water, and the acid and alkali be disengaged from it, so that the water would have no share in their production. Assuming this, he proceeded to try whether the total removal of the cause would destroy the effect; or, at least, the diminution of it cause a corresponding change in the amount of effect produced. By the substitution of gold vessels for the glass without any change in the effect, he at once determined that the glass was not the cause. Employing distilled water, he found a marked diminution of the quantity of acid and alkali evolved; still, there was enough to show that the cause, whatever it was, was still in operation. Impurity of the water, then, was not the sole, but a concurrent, cause. He now conceived that the perspiration from the hands touching the instruments might

affect the case, as it would contain common salt, and an acid and an alkali would result from its decomposition under the agency of electricity. By carefully avoiding such contact, he reduced the quantity of the products still further, until no more than slight traces of them were perceptible. What remained of the effect might be traceable to impurities of the atmosphere, decomposed by contact with the electrical apparatus. An experiment determined this: the machine was placed under an exhausted receiver, and when thus secured from atmospheric influence, it no longer evolved the acid and the alkali."

Cf. Mill, *Logic*, B. 3, chapters 8 and 9.

57: *d.* Is it possible that an effect can have more than one cause?

When we seek to determine the cause of a given effect, there are three theories open to us:

(1) That the effect has one invariable cause.

(2) That the effect is due to one of two or more different causes—though different causes more frequently produce *similar* effects than the *same* effects.

(3) That the effect is due (which is frequently the case) to a combination of causes. But complicity of causes would give us, naturally, a complex effect—each part of which, with sufficient mental strength and acuteness, we might be able to trace to its one invariable cause.

In the first and third cases, the effect must always be accompanied by the assumed cause. In the second case, the assumed cause may be now present, now absent; but when this is the case, we have, very possibly, confounded an accidental concomitant with a cause.

See Mill, *Logic*, vol. i., p. 482 sq.

57: *e.* Enumerate and explain the Methods of Induction recognized by Mill.

(1) *The Method of Agreement*, which consists in comparing different instances in which a given phenomenon

Ill 1- Bright prismatic colours seen on bubbles, films of oil floating upon water, on thin plates of mica etc:— antecedent, thin plate of any substance; consequent, bright prismatic colours

Ill. 2. Sir David Brewster experiment with mother-of-pearl

occurs. The canon as stated by Mill (*Logic,* vol. i., p. 428) is: "If two or more instances of the phenomenon under investigation have only one circumstance in common, the circumstance in which alone all the instances agree is the cause of the phenomenon." Thus (letting the capital letters represent antecedents, and the lower-case letters, consequents) if *ABC* give *abc,* and *ADE, ade, A* is probably the cause of *a*. *BC* can not be, for they were not present in the last instance; nor *DE,* for they were not present in the first. As the result of comparison, we eliminate variable antecedents. "It is the one antecedent, or group of antecedents, always present when the effect is present, that we consider the cause." (*Jevons.*)

For example: A native of the torrid zone, visiting New England, finds a sheet of water, on some winter's morning, covered with ice. The antecedents to this phenomenon were (we will say) *darkness, intense cold, cloudy weather, and a north-east wind;* and these he would naturally regard, upon one observation, as the causes of the formation of ice. He finds ice formed on another occasion, however, after *a clear, calm, intensely cold night.* Again, he finds ice in formation during an *intensely cold day,* whether clear or cloudy, whether calm or windy. As the result of a comparison of these observations, he decides that the one invariable antecedent, *intense cold,* is the cause of the formation of ice.

(2) *The Method of Difference,* which consists in comparing instances in which the phenomenon occurs, with instances, in other respects similar, in which it does not occur. The canon, as stated by Mill, is:

"If an instance in which the phenomenon under investigation occurs, and an instance in which it does not occur, have every circumstance in common save one—that one occurring only in the former—the circumstance in which alone the two instances differ is the cause, or an indispensable part of the cause, of the phenomenon."

Jevons's statement is quite as clear and conclusive: "The antecedent which is invariably present when the phenomenon follows, and invariably absent when it is absent (other circumstances remaining the same), is the cause of the phenomenon."

Thus, if *ABC* gives *abc*, and *BC* gives *bc*, *A* may be safely assumed as the cause of *a*. Our object here is to eliminate variable antecedents, but by a different method. This second method is more decisive than the first, but is better adapted to experiment than to observation. The chemist can bring together *ABC* and *BC*, and note the difference in their respective effects; but the requisite combinations of antecedents may not present themselves in nature. Where the second method is feasible, the first naturally precedes it and prepares the way for it.

For example: An intensely cold, cloudy, windy night does yield ice; a cloudy, windy night, without intense cold, does not yield ice. Therefore, intense cold must be the cause of the formation of ice.

(3) *The Joint Method of Agreement and Difference.* This method (which is useful where the second method is not available) consists in a comparison of several cases in which *a* occurs, with several cases in which it does not occur. Thus: *ABC*, *ADE*, *AFG*, all yield *a*; *HIJ*, *KLM*, *NOP*, do not. Here we establish a connection not only between the presence of *A* and the presence of *a*, but between the absence of *A* and the absence of *a*. Hence, we arrive substantially at the "Method of Difference":

ABC yields *abc*;
BC " *bc*;
∴ *A* " *a*.

The canon of this method, as stated by Mill (*Logic*, vol. i., p. 435), is: "If two or more instances in which the phenomenon occurs have only one circumstance in

common, while two or more instances in which it does not occur have nothing in common save the absence of that circumstance, the circumstance in which alone the two sets of instances differ is the cause, or an indispensable part of the cause, of the phenomenon."

(4) *The Method of Residues,* which proceeds by subtracting from any given phenomenon all the portions that, by previous inductions, can be assigned to known causes. Thus:

If ABC yields abc,
B " b,
C " c,
A " a.

This is, in reality, but a modification of the "Method of Difference," but is frequently available where that is not.

The canon of this method, as stated by Mill (*Logic,* vol. i., p. 437), is: "Subduct from any phenomenon such part as is known, by previous inductions, to be the effect of certain antecedents, and the residue of the phenomenon is the effect of the remaining antecedents."

(5) *The Method of Concomitant Variations.* The canon of this method (which is useful in determining the relations of "permanent causes, or indestructible natural agents") is: "Whatever phenomenon varies in any manner whenever another phenomenon varies in a particular manner, is either a cause or an effect of that phenomenon, or is connected with it by some fact of causation" —as, for instance, a common cause. Thus:

If A yields a,
A^2 " a^2,
$\frac{A}{2}$ " $\frac{a}{2}$

there is some causal connection between *A* and *a*. One is the cause of the other, or they are both related to a common cause.

For example: If intense cold is the cause of the formation of ice, the more intense the cold, the more ice; and the less intense the cold, the less ice.

58. What is the nature and value of the Argument from Analogy, and what especial caution is necessary in its use?

The Argument from Analogy is an inference of resemblance between objects or between classes, in certain particulars where resemblance has not been observed, on the ground of an observed resemblance in certain other particulars.

This argument falls mainly within the scope of Inductive Logic, and is of slight value in establishing a point, since it merely creates a presumption in favor of our position. In refuting objections, it is far more useful, and has been largely employed in religious controversy—notably by Bishop Butler. For example: It is inferred from the suffering of even the innocent in this life, that the suffering of the guilty in the life to come is not incompatible with the nature of God. This argument is, however, mainly useful as a guide in our search for those underlying causes, or general principles, which may serve as a substantial basis of classification. In employing it, we should be especially careful that the resemblances which we note are actual, essential, and as numerous as possible; and that the resemblances which we predicate fall within the same category as those which we note. Otherwise we become involved in the fallacy *Non tale pro tali*. Cf. Mill, *Logic*, p. 491 sq., Amer. ed.

For example: If A. and B. are known to be admirers of Tennyson, and A. is also known to be a lover of Words-

worth, we may safely predict that B also will be a lover of Wordsworth ; since Wordsworth and Tennyson are, in many respects, similar. But we can not, on the ground of A.'s liking oysters, predict that B. will like oysters ; since the similarity of tastes previously established between A. and B. is intellectual, not gustatory.

59. What is the nature, and what are the uses and tests, of Scientific Hypothesis?

Scientific hypotheses are explanations of observed phenomena, which are provisionally accepted to account for those phenomena until, by observation and reflection, we can determine the real principle upon which those phenomena depend. These hypotheses are originated by those thoroughly trained minds which seem to be naturally endowed with a keen perception of analogies, and are instrumental in promoting that search for causes which transmutes scientific conjectures into scientific principles. See *Thomson*, § 115. They are useful, also (like the rod and wires that give form to the skeleton), in enabling us to grasp and retain those apparently related facts which are likely to be dissociated, or altogether lost, unless we do group them about a common center.

The only danger that results from our employment of hypotheses arises from our liability to forget that the hypothesis which we have accepted is only an enlightened conjecture, requiring to be verified—not a fact.

60. What distinction is to be made between hypotheses, theories, and systems?

A sharp distinction is to be made between the words "hypothesis" and "theory," though they are often used interchangeably. By "hypothesis," we are to understand the conjectural explanation of certain phenomena by reference to an *assumed* cause ; by "theory," the conjectural

explanation of certain phenomena by reference to a *real* cause. The cause must, in the latter case, be known to produce effects similar to those which we seek to explain; and the value of the theory will correspond to the nature and degree of that similarity. By proving the existence of the cause assumed in an hypothesis, the hypothesis is verified, and becomes a "theory." By proving that the cause thus shown to exist is actually the cause of the phenomena under consideration, the theory is verified, and becomes a fact, or—if at all complicated—a system.

A proposed hypothesis should be rigidly subjected to the following tests:

(1) It must not be assumed to account for what can be explained on known principles.

(2) It must be adequate to account for all the known facts in a given case.

(3) It must be independent of subsidiary hypotheses. To illustrate: Biot, to account for the Northern Lights, propounded the hypothesis that they are caused by the play of electricity through immense columns of minute particles of iron, suspended in the region of the pole—an hypothesis which is defective in that it leaves unsolved the questions: Where do the particles of iron come from? and how are they held in position?

See Fleming, *Vocab. of Phil.*, *sub voce* "Hypothesis."

61. What classifications have been proposed within the sphere which Applied Logic embraces?

The sphere of Applied Logic embraces all that about which the mind thinks; and it may be roughly classified as including:

(1) The *ego.*

(2) The *non-ego.*

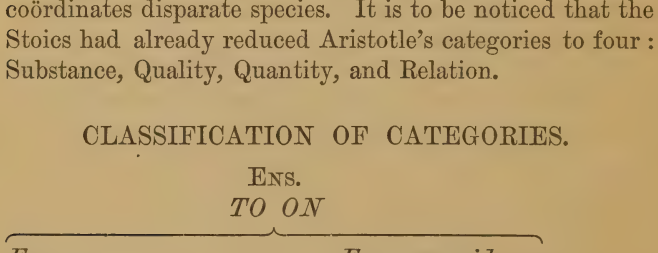
(3) That absolute being which is neither the *ego* nor the *non-ego.* See *Thomson*, p. 246.

Not content, however, with this general classification, philosophers have sought to give minute and exhaustive divisions of the province of thought.

See *Atwater*, pp. 213–216, for the categories of Aristotle, Kant, M'Cosh, Mill, and Thomson.

Though this subject falls rather within the scope of Metaphysics than that of Logic, I append a rearrangement of the Aristotelian "categories"—i. e., the classes into which our thoughts must fall—which is suggested by Hamilton in his *Logic*, p. 139 sq., and subsequently worked out in his edition of *Reid*, p. 687, note. This table—which Hamilton does not regard as exhaustive, but as being correct so far as it goes—may serve, at least, to show that Aristotle, in his world-renowned categories, coördinates disparate species. It is to be noticed that the Stoics had already reduced Aristotle's categories to four: Substance, Quality, Quantity, and Relation.

CLASSIFICATION OF CATEGORIES.



The Greek words in the above table indicate the categories as designated by Aristotle; the numbers, the order in which he arranged them. Hamilton quotes from Mur-

melius the following mnemonic lines, which may serve to recall the Aristotelian categories :

Arbor[1] sex[2] servos[4] fervore[3] refrigerat[9] ustos[10] ;
Ruri[5] cras[6] stabo[7], nec tunicatus[8] ero.

Cf. Bain, *Mental Science*, Am. ed., appendix, p. 17 (note), and *The Scriblerus Papers*, ch. 7, Pope's Works, Vol. vi., p. 152.

62. Indicate the relation of Applied Logic to Scientific Discovery.

While Logic is susceptible of practical application to all the matters about which we think, however diversified and disconnected, it aims especially to accomplish :

(1) The Construction of Sciences, by referring particular phenomena in any department of inquiry to a general principle, identifying that principle with a cause, and defining and classifying all its effects in accordance with the methods already indicated.

It is only by the rigid and persistent application of the Laws of Thought that any science can be constructed ; and, thus, even physical science is dependent for its very being on the laws of that immaterial existence which it so often slights and depreciates. Alexander Bain says (*Deductive Logic*, p. 26) : "There can be no science without assuming all the data of Logic, whether avowedly or not." The same point is abundantly conceded by Jevons in his admirable *Principles of Science*. Logic is not, therefore, as many have thought, a thing of the dead past. It belongs to the living present. Independent of it, no science —whether mental or physical—is possible.

(2) Logic contemplates the Classification of the Sciences, so as to exhibit their mutual relation, and their common dependence on the Great First Cause. The statement and criticism of the results attained by Logic in this direction belong rather to Metaphysics. See, how-

ever, *Thomson*, pp. 315–320 ; *Atwater*, p. 109 ; and Bain, *Deductive Logic*, pp. 23–30.

Bain—whose Classification of the Sciences is the best I have yet seen—gives as

DEPARTMENTAL SCIENCES.

1. Logic.
2. Mathematics.
3. Mechanical Physics.
4. Molecular Physics.
5. Chemistry.
6. Biology.
7. Psychology.

An eighth should, I think, be added—namely :

8. Theology.

EXAMPLES FOR LOGICAL PRAXIS.

I. Point out the defects in the following arguments:

1. All that glitters is not gold. This watch glitters. Therefore, this watch is not gold.

2. Oaks are vegetable. Oysters are not oaks. Therefore, oysters are not vegetable.

3. What we eat grows in the fields or is the flesh of animals. Cooked food is what we eat. Therefore, cooked food grows in the fields or is the flesh of animals.

4. Typhoid fever is epidemic, because A, B, and C have it.

5. He who calls you a man speaks truly. He who calls you a fool calls you a man. Therefore, he who calls you a fool speaks truly.

6. No pagan is a Christian. Every villager is a pagan. Therefore, no villager is a Christian.

7. If a man is a kind father, he will provide food and clothing for his children. Mr. A. provides food and clothing for his children. Therefore, he is a kind father.

8. Animal food may be entirely dispensed with, and vegetable food may be entirely dispensed with. But all food is either animal food or vegetable food. Therefore, all food may be entirely dispensed with.

9. Nothing is heavier than platinum. Feathers are heavier than nothing. Therefore, feathers are heavier than platinum.

10. These people are patriots because they are free.

11. He who is most hungry, eats most. He who eats least, is most hungry. Therefore, he who eats least, eats most.

12. Whatever is universally believed must be true. The existence of God is not universally believed. Therefore, it is not true.

13. A successful author must either be very industrious or very talented. Gibbon was very industrious. Therefore, he was not very talented.

14. God is in every place. This room is not every place. Therefore, God is not in this room.

15. An inflated currency promotes national prosperity, because it enables people to make rapid fortunes.

16. "Improbable events happen almost every day. But what happens almost every day is a very probable event. Therefore improbable events are very probable events."—*Whately.*

17. Hard substances are elastic; for ivory is both hard and elastic.

18. We have satisfactory evidence that Mr. A. did not take a bribe during the last session of the assembly. Therefore, he is entirely worthy of the suffrages of the people.

19. Mahomet was a wise lawgiver, for he studied the character of his people.

20. "He would not take the crown. Therefore, 'tis certain he is not ambitious."

21. "Last evening Rev. J. T. Kendrick lectured at Neptune Hall, No. 405 Grand Street, on Temperance. He argued that if alcohol had been necessary for man, God would have provided it for him at the creation; and that, as alcohol is produced by the decay of vegetable matter, it can not give health or strength, or sustain the life of animals."

22. "Aussi ne peut on échapper à ce dilemme: S'il y a quelque bénéfice a retirer d'une industrie, elle n'a pas besoin d'encouragement: s'il n'y a point de bénéfice a en retirer, elle ne mérite pas d'être encouragée."—*Blanqui, Économie Politique*, p. 75.

23. Books are a source both of instruction and amusement. A table of logarithms is a book. Therefore, a table of logarithms is a source both of instruction and amusement.

24. "If it is fated that you shall recover from the present disease, then you will recover, whether you call in a physician or not. If it is fated that you shall not recover, then, with or without a physician, you will not recover. But either the one or the other of these is fated. Therefore, it will be of no use to call in a physician."—*Cicero.*

25. It is universally conceded that careful and assiduous vocal training is absolutely essential to good singing. Therefore, careful and assiduous vocal training is absolutely essential to good speaking.

II. EXPLAIN THE NATURE OF THE FOLLOWING ARGUMENTS, AND COMPLETE THOSE THAT ARE IMPERFECT. ARE ANY OF THEM FALLACIOUS? IF SO, IN WHAT RESPECT?

26. Plants are bodies with organizations. Potatoes are plants. Therefore—

27. Ireland is idle, and therefore starves; she starves, and therefore rebels.

28. The child of Themistocles governed his mother; she governed her husband; her husband governed Athens; Athens, Greece; and Greece, the world. Therefore, the child of Themistocles governed the world.

29. Any one who is candid will refrain from condemning a book without reading it. Some reviewers do not refrain from this. Therefore, some reviewers are not candid.

30. Every effect must have an adequate cause. Therefore, the world must have been created.

31. "Cogito; ergo, sum."—*Des Cartes.*

32. The cars stop at Waterloo one half the time. The cars carry the mail one half the time. Therefore—

33. The cars stop at Waterloo one half the time. The cars carry the mail three fourths of the time. Therefore—

34. "The prisoner was at the place at the time of the murder. He participated in the motives which led to the commission of the murder. He owned, and usually carried with him, the weapon with which the murder was committed. He shared in the means afterward taken to divert attention from those who were actually engaged in committing the murder. Therefore, the prisoner is guilty."—*Webster in the Knapp case.*

35. The dog, the fox, the wolf and the jackal are carnivorous. The dog, the fox, the wolf, and the jackal are all animals having canine teeth. Therefore, all animals having canine teeth are carnivorous.

36. "Now a mediator does not appertain to one, but God is one."—*Gal. iii. 20.*

37. The Devil to Cuvier: "I have come to eat you." Cuvier to the Devil: "Cloven hoofs—Horns—come on!"

38. "There is none good but one, that is God. Christ is good, therefore he is God; or Christ is not God, therefore he is not good."—*Stier.*

39. "Shall that be shut to man which to the beast is open?" —*Par. Lost, B. 9, 691–692.*

40. "Of good, how just? of evil, if what be evil be real, why not known, since easier shunned?"—*Par. Lost, B. 9, 698–699.*

41. "Only a good man can be an orator, for intelligence would not be conceded to those who choose the worse rather than the better course, nor prudence to those who subject themselves to punishment."—*Quintilian.*

42. "For as many as are of the works of the law are under the curse; for it is written, Cursed is every one that continueth not in all things which are written in the book of the law to do them. But that no man is justified by the law in the sight of God, it is evident: for, The just shall live by faith. And the law is not of faith; but, The man that doeth them shall live in them." —*Gal. iii. 10–12.*

43. Newsboy: "Here's the *Evening Express*, only two cents." Passer-by: "I'll take one." Newsboy (after supplying his customer): "Here's the *Evening Express*, only three cents."

AS CONFEDERATE bonds have unexpectedly become worth something, people had better begin to save their original poetry.

Louisville Tow. Journ.

44. The Christian religion is not recognized by the law of the land, because it is not even mentioned by the Constitution of the United States.

45. The Hebrews were forbidden to make to themselves the likeness of anything that is in the heaven above, or in the earth beneath, or in the waters under the earth. Therefore, the cherubim are not real existences.

46. Gold and silver are wealth; and therefore the diminution of the gold and silver in the country by exportation is a diminution of the wealth of the country.

47. "All men have their price."

48. "The barrenness of the soil in Northeastern Siberia, and the severity of the long winter, led man to domesticate the reindeer as the only means of obtaining a subsistence; the domestication of the reindeer necessitated a wandering life; a wandering life made sickness and infirmity unusually burdensome to both sufferers and supporters; and this finally led to the murder of the old and sick, as a measure both of policy and mercy."—*Tent Life in Siberia, p. 215.*

49. Force and matter are inseparable. Therefore, there can have been no creation of matter.—*Büchner.*

50. "Our professor is opposed to sectarian colleges; therefore, he favors irreligious colleges."

III. MISCELLANEOUS EXAMPLES TO BE REDUCED TO STRICT LOGICAL FORM, TESTED, AND, WHERE NECESSARY AND POSSIBLE, REFUTED.

51. It is the duty of a government which takes charge of the education of its citizens, to provide for them such an education as they can conscientiously avail themselves of. The only education that Roman Catholics can conscientiously avail themselves of is one conducted by priests, who shall inculcate the tenets of their Church *pari passu* with secular knowledge. Therefore, it is the duty of our government to provide such an education.

52 [in reply to 51]. "Other folks have consciences as well as the Roman Catholics."—*A Student.*

53. It is the duty of a state to provide for its citizens such educational facilities as will qualify them, in the highest degree, for the discharge of their social and political duties. The only education which can thus qualify them must have its foundation in religious principles. Therefore, the Bible should be retained in the common schools.

54. On the same principle which is urged as an objection to retaining the Bible in the common schools, the Roman Catholics might object to making use of any text-books which contain extracts from the Bible, or are founded on the truths of the Bible. But to abandon these text-books would be to forego the enlightenment and civilization of the nineteenth century. Therefore, the Bible should not be removed from the schools.

55. To make a man pay for instruction of which he can not conscientiously avail himself, is contrary to the spirit of our institutions.

The retention of the Bible in schools supported by indiscriminate taxation, makes Roman Catholics pay for instruction of which they can not conscientiously avail themselves. Therefore, either the Roman Catholic should be excused from paying for the support of the common-school system, or the Bible, against which he objects, should be removed from the schools.

But to excuse the Roman Catholic from paying for the support of the common-school system, would be a greater evil than the banishment of the Bible from the common schools; for the retention of the Bible is of but slight practical value, while to excuse the Roman Catholic from contributing for the support of our schools, would lead to the education of many children under influences hostile to the republic. Therefore, the Bible should be banished from the schools.

56 [in reply to 55]. "The Romanists manifest no especial regard for 'the spirit of our institutions.'"—*A Student.*

57 [in reply to 55]. "If we yield this point to gratify the consciences of one body of men, we must keep on yielding to gratify other bodies of men, till we have no school system left."—*A Student.*

58 [in reply to 55]. "If the Irish Catholics don't like the in-

stitutions of the country which has them go back whence they came."—

59. To remove the Bible from th to hasten the downfall of Romanism activity among Protestants.

60. "If the Bible be read in c with comments or without. But suffers that to pass as the Word of (or mistranslation, of man; while to read it with comments would be to open the door to sectarian instruction. Therefore, the Bible should not be retained in the schools."—*A Student.*

61. "The laws of the land do not, and can not, take cognizance of any religious sect. But if the Bible be removed from the schools, it would be on account of the claims of a sect. Therefore, the Bible should not be removed from the schools."—*A Student.*

62. "Any true education is impossible save in connection with religious instruction. But the state has no right to interfere with the religious instruction of its children. Therefore, the state has no right to maintain a system of common schools."—*Bp. McQuaid.*

63 [in refutation of 62]. "If the words 'religious instruction' have reference to 'the recognition of God as an object of worship, love, and obedience,' the minor premiss is unwarrantably assumed; if the words 'religious instruction' refer to the inculcation of the tenets of any particular system of faith and worship, the major premiss is unwarrantably assumed. But the words 'religious instruction' must be used, throughout the syllogism, in one of these senses, else the syllogism involves four terms. Hence the Bishop's argument is fallacious."—*A Student.*

64. "Perhaps the most noticeable thing in this part of the reverend Doctor's discourse is the holy horror of *crosses* and *saints* which he displays. 'The Catholic child,' he says, 'comes with his crosses and saints upon his back,' while the Presbyterian or Baptist leaves his *peculiarities* behind him. Truly, a convenient religion, which can be taken along or left at home at pleasure!"—*A Catholic Citizen.*

65. "Imagine a Democrat going to the school-board and say-

The Rev. G. B. Gow, of Brattleboro, Vt., regards the Bible as a book of reference which should be in every man's hands, but not as a text-book to be used in the public schools for instruction in morals. He says: "As a Baptist I should protest, in the name of that religious liberty for which my Baptist ancestors suffered martyrdom, against my children being compelled to be taught in state schools the Roman Catholic doctrine of God's moral government; and, in the name of the same liberty, I protest in behalf of my Roman Catholic fellow-citizens against their being taught a system of divine government from which what they regard as the most hallowed sanctions of the divine law are omitted."

ing: 'My boy must not read the Constitution of the United States, except in an exclusively Democratic school, where it will be expounded to him according to the tenets of the Democratic faith.'" —*N. H. Statesman.*

66. We ought not to insist on the retention of the Protestant Bible in our schools, unless we are willing to acquiesce in the admission of the Douay version if the Romanists should come to be in the majority.

67. True prayer implies belief that God will hear and answer. Praying to see whether God will hear and answer implies a doubt in these respects, and is, therefore, not true prayer. To pray, and at the same time not to pray, is the negation of thought.

68. True prayer implies acquiescence in the will of God. To demand of God specific answers foregoes such acquiescence. Therefore, Tyndall's proposed prayer-test is impossible.

69. "Tyndall's proposed prayer-test seems to me ridiculous, for twenty years ago God converted my soul."

70. Science recognizes both observation and experiment as legitimate means of verifying physical phenomena. Why, then, should it be proposed to restrict the testing of prayer to experiment?

71. If, as some claim, Tyndall's proposed prayer-test has already been applied, and that with divine sanction, in the case of Elijah and the prophets of Baal, what objection to applying it now?

72. "The Church of England varies every week the chapters to be read from the sacred volume, which would bear to be repeated at least as often as the prayers which she has decreed to be sounded in my ears as often as I enter her hallowed walls."—*Bennett & Bogue: Hist. of Dissenters.*

73. Mr. Pendleton having said, in one of his sophomoric speeches, that it was an appalling fact that there wasn't money enough in the country, by $150,000,000, to pay the taxes of the nation and States, if the people were required to pay them all in one day, Senator Morton replies as follows in his Cincinnati speech: "Well, now, that is a tremendous thought; and it is also an appalling fact that if the people were required to eat in one

day all they now eat in the course of a year, they would inevitably burst."

74. The more correct the Logic, the more certainly the conclusion will be wrong if the premisses be false. Therefore, where the premisses are wholly uncertain, the best logician is the least safe guide.

75. Logic, as it was cultivated by the Schoolmen, proved a fruitless study. Therefore, Logic, as it is cultivated at the present day, must prove a fruitless study.

76. Ministerial education is unnecessary because A., B., and C. (successful ministers) are comparatively uneducated.

77. "Cornell University, being a state institution, is by law undenominational; and as religion, under our present circumstances, must be the religion of some denomination, the university can not teach religion without breaking the law. This is its sufficient answer to all who assail it on that ground. Irreligious it is not, any more than any other university, or any section of society, in an age in which skepticism can hardly be kept out even by the bars and bolts of a Jesuit college."—*Goldwin Smith.*

78. "While other professions all have their special charities, their professional 'homes' and 'retreats' and 'rests' for disabled members, we do not remember to have heard of such an establishment for teachers till within a few weeks."—*N. E. Jour. of Education.*

79. "Every *this* implies a *that.* Any grammarian would tell you that you couldn't have a *this* without a *that.* Now the text speaks of separation in *this* world; therefore, there must be separation in *that* world."

80. "He then passed on to the consideration of the evidence of McCormick and Kavanagh, in reference to the recognition of Kavanagh by Clark, after the latter's arrest. One officer had testified that Clark had said, 'By *God*, Kavanagh, I wouldn't have shot you if I had known you'; while the other officer testified that Clark had said, 'By *Jesus Christ*,' etc. He held that where they could not agree upon so immaterial and insignificant a point as this, surely they were not to be relied upon in matters of more importance."

Put in full Def. form + indicate any defects.

Is not the value of Grammar, as a study, ~~is~~ seriously underrated? [illegible] the [illegible] language? (Mrs. Rev of Wm. P)

Indicate any defect in the following exp.

"[illegible] be changed." (Lowell

P.T.O.

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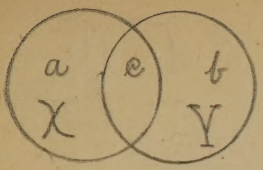

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Y = poisen
a = celery
e = belladonna
b = arsenic

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Some plant(belladonna) is poisen
O. Some X(a) is not Y(e+b)
Some plant(celery) is not poisen
η. No X(a+e) is some Y(b)
No plant is arsenic-poisen
ω. Some X(e) is not some Y(b)
Some plant(celery) is not arsenic-poisen

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